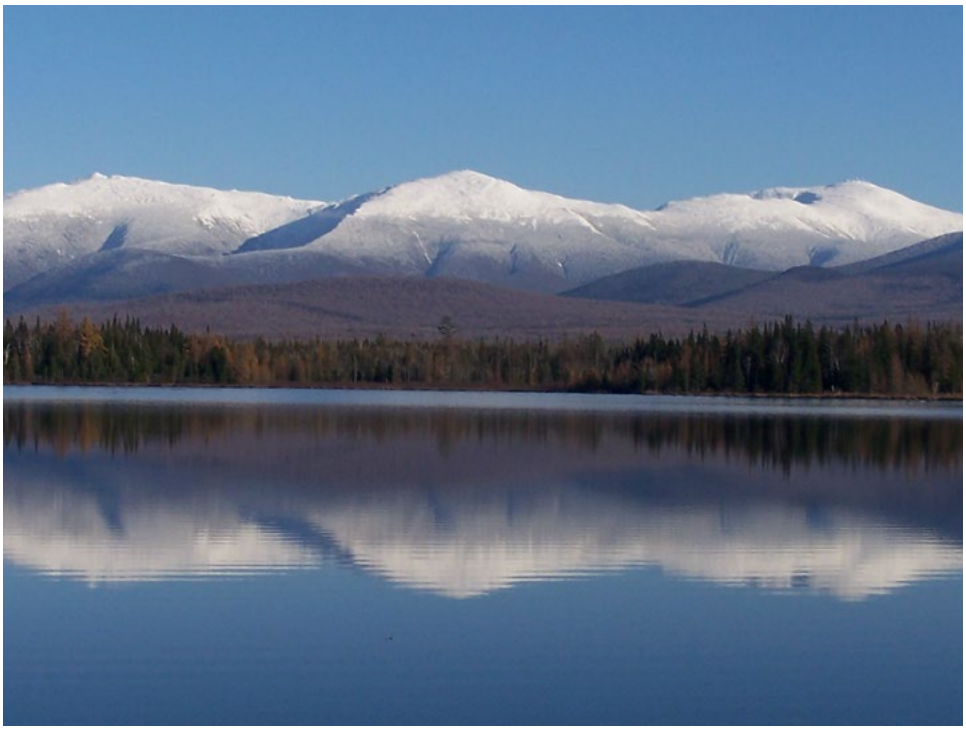
Chapter 4



Dave Govatski

Cherry Pond on Pondicherry Division, New Hampshire

Alternatives, Including the Service's Preferred Alternative

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Introduction

This chapter presents:

- Our process for formulating management alternatives.
- Alternatives and actions considered but eliminated from detailed study.
- A description of the four management alternatives we evaluated in detail, and their relationship to refuge purposes and goals.
- Actions common to all alternatives, including the "no action" alternative, which we define as continuing current management (alternative A).
- Actions common to all the "action" alternatives (alternatives B, C, and D).
- A table (table 4.6) that compares how each of the alternatives addresses significant issues, supports major programs, and relates to refuge goals.
- Maps (maps 4.3 through 4.19) that depict the proposed CPAs.
- Maps (maps 4.20 through 4.40) that depict the proposed location and size of each CFAs under the four alternatives.
- Maps (maps 4.41 to 4.49) that show the proposed public use and access under the four alternatives for the Pondicherry and Nulhegan Basin Divisions, the two largest, existing refuge divisions.

Formulating the Alternatives

NEPA requires Federal agencies to evaluate a full range of reasonable alternatives to a proposed action. Alternatives should be relevant to the purpose and need of the proposal while minimizing or avoiding detrimental environmental effects. The development of alternatives as a part of the NEPA compliance process allows the Service to work with the public, stakeholders, interested agencies, and other partners to formulate alternatives that respond to issues and concerns identified during the planning process.

The four alternatives described in detail in this chapter, include a "no action" or "no change" alternative required by NEPA, and three "action" alternatives. We define the "no action" alternative as "continuing current management direction." Each of the alternatives describes a combination of priorities and actions for contributing to conservation work in partnership with others across the watershed, and for managing refuge lands, over the next 15 years. The alternatives are organized to show how they would address the four broad goals we have established for the refuge related to (1) conservation, (2) environmental education, interpretation, and outreach, (3) recreation, and (4) partnerships. Each alternative would ultimately result in a different future condition for the refuge and therefore make different contributions to the watershed over the long term.

As we described in chapter 2, developing watershed-based goals for the refuge was one of the first steps in our planning process and a prerequisite to developing alternatives. Goals are intentionally broad, descriptive statements of our desired future condition for the watershed's and refuge's resources. By design, they are less quantitative and more general in defining the targets of our management. They also articulate the principal elements of refuge purposes and our vision statement and provide the foundation for developing alternative management objectives and strategies. Our goals, listed later in the chapter, are common to all the alternatives.

Management alternatives were developed after identifying a wide range of possible management objectives and strategies that could achieve refuge goals. These alternatives can be described as packages of complementary objectives and strategies. Objectives are essentially incremental steps toward achieving a goal; they also further define the conservation and management targets in measurable terms. They typically vary among the alternatives and provide the basis for determining more detailed strategies, monitoring refuge accomplishments, and evaluating our success. Management objectives and strategies are also developed to respond to public input concerning challenges and opportunities identified during the planning process and public scoping meetings.

We analyze four alternatives in this final CCP/EIS that characterize different strategies for conservation in the watershed and, specifically, for managing refuge lands over the next 15 years. We have titled these alternatives as follows:

- Alternative A–Current Management (this represents the NEPA-required "No Action" alternative).
- Alternative B–Consolidated Stewardship.
- Alternative C–Enhanced Conservation Connections and Partnerships (Service-preferred alternative).
- Alternative D–Reduced Management with Emphasis on Backcountry Recreation.

We believe these four alternatives represent a reasonable range of proposals for achieving the refuge's vision, purposes, goals, and objectives, and for addressing the issues described in chapter 1. These four alternatives are described in more detail below under "Description of the Alternatives," where we also include maps, tables, and figures to present the alternatives.

Alternatives or Actions Considered but Eliminated from Detailed Study

There are some alternatives or actions that were suggested to us, but we did not analyze in detail. Below we discuss why we eliminated them from further analysis.

Continuation of the Special Focus Area (SFA) strategy for refuge land acquisition envisioned in the 1995 FEIS creating Conte Refuge.

The design for refuge acquisition in the 1995 FEIS was to acquire primarily small, scattered parcels within 65 SFAs distributed across the four states in the watershed. A main focus of this strategy was to target parcels with populations of federally listed endangered and threatened species, or rare and uncommon species and natural communities. Implementation of this strategy has proved problematic for several reasons. While many of the acquired parcels may contain breeding habitat for federally listed or rare species, and thereby offer an important, immediate, and direct level of protection for those species; over the long term, the distribution of small, scattered parcels does not consider other important factors. For example, this strategy does not consider species' travel or movement corridors. Nor does it necessarily provide for important habitats used by the species outside of breeding season. It also does not adequately resolve threats on adjacent or nearby lands, or support opportunities to restore habitats on a meaningful scale or in a sustainable way. Finally, this strategy does not address the potential impacts from climate or land use changes. Each of these considerations is important to address when considering the long-term viability of species populations and habitats in the watershed.

Administratively, managing small, scattered parcels is inefficient when considering resource investments and cost per acre. The resources expended

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Visitor contact station at Nulhegan Basin Division

to get staff and equipment to these sites to manage small units (e.g., post boundaries, brush vegetation, mow fields, conduct surveys, maintain trails and facilities, resolve encroachments, and conduct law enforcement) is much less efficient on a cost per acre basis compared to larger, more contiguous parcels where more acres can be treated on a single trip. We also believe this acquisition strategy will not be effective in protecting species and crucial habitats over the long term, and unnecessarily limits our ability to practice strategic habitat conservation and fulfill the refuge's purposes.

In our judgment, due to the biological, ecological, and administrative concerns we raise above, the SFA strategy for refuge land acquisition is not in the best interest of the American public because taxpayer's monies can be used more efficiently, and this approach restricts our flexibility in addressing other factors necessary for conserving Federal trust species on a larger regional basis.

No additional refuge land acquisition by the Service; partners would assume all future land protection.

Under this scenario, the Service would not acquire any additional refuge lands, and we would fully rely on our local, State, other Federal agency, and private partners to expand the protected conservation lands network to accomplish the legislated refuge purposes and achieve the desired outcomes typically supported by land conservation actions when employed as a method to accomplish refuge objectives.

There was widespread support for the 1991 Conte Refuge Act and the 1995 FEIS decision to establish the refuge and to have the Service facilitate conservation partnerships and encourage coordinated conservation action among State and other Federal agencies, local governments, and non-governmental partners across the four states in the watershed. The 1995 decision incorporated direction for the Service to lead by example in protecting lands for the refuge, and managing and restoring those lands to benefit Federal trust resources. Refuge land protection was to complement the land protection efforts of our conservation partners to ensure that a watershed-wide, conserved lands network would be developed to permanently protect species of conservation concern and native biodiversity. From the refuge's beginning, the Service's policy is to only acquire lands from willing sellers. Our partners supported then, and continue to support today, a distribution of responsibility to contribute to the conserved lands network within the watershed with the Service a major contributor through refuge acquisition.

Eliminating the acquisition program for the refuge:

- Fails to promote the strategic long-term protection of important wetland and upland habitats for Federal trust resources in the congressionally designated project area.
- Impacts our relationship with State and conservation partners who have recommended and supported Service land conservation actions as part of continuing cooperative and strategic resource stewardship in the watershed.
- Risks losing a critical opportunity over the next 15 years to help provide vital, sustainable, and resilient connections between existing conservation lands of high resource value, and that opportunity will be lost as ownership and habitat fragmentation continues and important habitats are converted to other uses.
- Affects our ability to meet the refuge's legislated purposes and the Service's objectives for Federal trust resources, such as threatened and endangered species, migratory birds, and interjurisdicitional fish.

We recognize that, in addition to our partners' dedicated efforts to protect lands, there are also regulatory land use controls that exist to various extents in the four watershed States and offer varying degrees of protection. For example, all four states have wetland protection laws. However, this protection is not uniform or consistently enforced, and many areas of the watershed are experiencing accelerated fragmentation and conversion of wildlife habitat and agricultural land to development. We have observed that relying on local regulatory controls alone is not always adequate to protect habitat for our Federal trust species. Land acquisition by the Serves allows owners of important habitat an opportunity to benefit from the equity in their property and do something good for wildlife and for people.

In summary, we believe that eliminating the option of any further land acquisition from willing sellers for the refuge would be inconsistent with the legislative mandate in the Conte Refuge Act, significantly affect our ability to meet refuge purposes, and break commitments made in the 1995 FEIS to play a significant role in the watershed's conservation partnership.

Using only conservation easements as the acquisition method, or another less-than-fee option, for all future refuge purchases.

Under this scenario, we would accomplish our habitat objectives by purchasing from willing sellers only a partial interest in lands, primarily in the form of a conservation easement. This means that no full fee simple acquisition for the refuge would occur. The easement land would remain in private ownership, and development rights would typically be the minimum rights the Service would acquire. We may also pursue additional easement rights that would allow us some ability to manage the land and provide opportunities for public use. However, selling an easement may not always be the preference of the landowner. In addition, land further south in the watershed is generally acquired in smaller parcel sizes, and the percentage of full fee value required to purchase an easement increases. Therefore, the cost of fee versus easement can become negligible in certain areas of the watershed. However, we believe easements should continue to be an option for the landowner, just not the only option. Further, we would hope to structure easements to assure the permanent protection of existing habitat, allow for habitat restoration and/or management, provide us an ability to manage access if endangered or threatened species are present, and provide public use opportunities if the landowner is willing.

We will continue to acquire conservation easements where appropriate, but on balance, a total reliance on this strategy would not allow us to accomplish stated conservation goals and objectives. Presently, NRCS has a wide range

of landowner incentive programs that provide opportunities for the enrollment of private land in easement programs or access to other financial assistance. Reliance solely on less-than-fee ownership would essentially compete with other popular Federal and State initiatives, and restrict the options available to the majority of landowners who want to sell in fee. An easement-only approach would decrease our flexibility in working with landowners and providing them options. Further, this approach would compromise our ability to be an active land protection partner throughout the watershed, filling a specific conservation niche within the conservation community.

Pursuit of land acquisition outside the watershed boundary.

We rejected this strategy because the 1991 Conte Refuge legislation defined the project area to be lands only within the Connecticut River watershed.

Management of refuge forests and agricultural lands for net present value (i.e., for profit).

The 1997 Refuge Improvement Act identifies wildlife conservation as a priority of the Refuge System. While commercial forest management actions may be used to meet some of our biological goals and objectives, pursuing timber harvest and hay or crop production with the primary goal of ensuring a profit, would not be consistent with Refuge System regulations (50 CFR 29.1) and policies (603 FW 2). Rather, our management objectives are based on providing the greatest benefit to priority refuge species and their habitats, NALCC representative species and their habitats, and other priority resources. We did not fully develop this alternative because it would not meet the stated goals and objectives we have proposed for the refuge, nor would it be consistent with Refuge System regulations or policies.

Elimination of all hunting opportunities on refuge lands.

This option is inconsistent with the 1997 Refuge Improvement Act which established hunting as one of six priority public uses for national wildlife refuges when determined compatible, and would not meet one of the 1991 Conte Refuge Act purposes which states "Provide opportunities for …fish and wildlife-oriented recreation and access to the extent compatible with the other purposes…" Eliminating hunting would also fail to meet Executive Order No. 13443 (August 16, 2007) which directs the Department of the Interior and other Federal land management agencies to "facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitats." This order also states that Federal agencies are to "manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, including through the use of hunting in wildlife management planning."

We did not fully develop the option of eliminating hunting entirely from the refuge because:

(1) It would not support the purposes for which Conte Refuge was established.

(2) It would not support Executive Order 13443.

(3) It would not support the 1997 Refuge Improvement Act that identifies hunting as a priority public use on national wildlife refuges when determined compatible.

(4) It would not satisfy refuge goal 3 to provide compatible recreational opportunities.

Detailed Description of the Alternatives:

Alternative A–Current Management

NEPA requires this "No Action" alternative (which we define as continuing current management) to serve as a baseline to which all other alternatives are compared. This alternative reflects the management direction and authorities in the 1995 FEIS with amendments and modifications that either underwent a separate NEPA process or were administrative changes. Under alternative A, refuge staff would maintain the status quo and continue current management for the next 15 years. Table 4.1 summarizes the actions that amended the 1995 FEIS and are incorporated by reference into alternative A. These include environmental assessments (EA) and categorical exclusions (CE) that were prepared in compliance with NEPA, including public and partner involvement, where required.

Table 4.1. Actions that Represent Amendments to the 1995 FEIS[1] for Conte Refuge.

Amended Action and Corresponding NEPA Document	Year Approved
Expansion of the Pondicherry Division via EA[2] and CEs[3]	EA–2003 CEs–2005, 2006, 2008, 2009, 2010, 2011, and 2013
Expansion of the Nulhegan Basin Division via EA and CEs	EA–1999 CEs–2006, 2010, and 2011
Expansion of the Fort River Division via CEs	CEs–2008 and 2010
Pondicherry Division Public Access Plan - EA	2008
Pondicherry Division Hunt Plan - EA	2007
Pondicherry Division Public Access Plan - EA	2008
Nulhegan Basin Division and Putney Mountain Unit Hunt Plan - EA	2013
Fort River Division Trail Construction - EA	2013
Nulhegan Basin Division Trail Construction - EA	2012
Nulhegan Basin Division Furbearer Management Plan - EA	2000
Nulhegan Basin Division Woodcock Management Plan - EA	2006
Nulhegan Basin Division Headquarters and Visitor Contact Station - EA	2002
Nulhegan Basin Division Aquatic Habitat Enhancement - CE	2013
Nulhegan Basin Division Opening Package, including Hunt Plan	2013

1 *1995 Final Environmental Impact Statement (FEIS) establishing Silvio O. Conte National Fish and Wildlife Refuge*

2 *Environmental Assessment (EA)*

3 *Categorical Exclusion (CE); current as of October 2013*

In the ROD for the 1995 FEIS, the Service selected "Revised Alternative D" for implementation. This alternative set a course for the refuge that employed new approaches not typical of national wildlife refuges established at that time. The distinction from other refuges was the emphasis on working with private landowners, State and local agencies, and private organizations to distribute refuge resources and assistance both on and off refuge lands to achieve conservation goals for the watershed. This final CCP/EIS appendix N attests to the level of current partner engagement, including the Friends of Conte and the wide range of non-governmental and governmental partners who have been instrumental in helping us achieve conservation priorities in the watershed. This focus on partnerships remains the intent under current management today, although our capabilities are limited by, and subject to, available funding and staffing.

The 1995 FEIS focuses on developing a private lands habitat management assistance program through the Service's Partners program, as well as implementing a Challenge Cost Share program to award grants to private landowners, State and local agencies, and private organizations for habitat and populations management projects. The expectation in the 1995 FEIS was that up to 25 percent of the watershed would be in conservation ownership, and refuge programs would contribute to improved habitat through management or land protection assistance to achieve that target. Environmental education opportunities are also a focus in the 1995 plan, with the intent to pursue governmental and nongovernmental education partners and establish a watershed-wide cooperative stewardship and education program.

The Service also approved a refuge land acquisition program under the direction of the 1995 FEIS to complement partner efforts while achieving refuge purposes. The land protection plan currently in operation on the refuge allows the use of easements, cooperative management agreements, and fee title acquisitions. It authorizes up to 97,830 acres within the watershed, including the land acquisition amendments listed in table *4.1.With* an emphasis on endangered, threatened, rare, and uncommon species and natural communities, approximately 65 SFAs are identified as target areas for Service acquisition. Many of the SFAs are generally small, scattered sites that met established criteria to achieve the refuge's legislated purposes that ranged in size from 15 acres to 22,000 acres. As of February 2016, the Service has acquired 37,000 acres of land since 1995 as a part of nine divisions and eight units distributed throughout the watershed. All land interest is acquired from willing sellers using the acquisition method (e.g., easement or fee title) the landowner prefers. Map 1.3 depicts current refuge ownership. Some of the current acres were acquired under the amendments noted in table 4.1above. Under alternative A, the Service would continue to acquire land under the original acreage authorization plus the amendments, concentrating land acquisition activities in the SFAs. As presented in tables 4.2 and 4.3 below, the current approved refuge acquisition authority is 97,830 acres. As envisioned in the 1995 FEIS, the Service would also continue to support land protection activities of other Federal and State agencies, as well as municipalities, non-governmental, and private partners, ideally through a fully funded Challenge Cost Share grant program, or by any other Service or other Federal agency programs designed for this purpose.

More details on alternative A by major resource program are provided below. Table 4.6 provides a summary of current and planned activities in comparison to the other action alternatives. The maps (maps 4.20 to 4.40) at the end of the chapter depict the CFAs under each alternative, including alternative A. Chapter 3 also provides some important details about refuge programs and priorities that would continue under alternative A. Finally, the actions covered in the section titled "Actions Common to All Alternatives" below is also incorporated into alternative A.

Wildlife and Habitat Conservation

On refuge lands, we would continue to harvest the woodcock habitat demonstration units on the Nulhegan Basin Division to improve forest habitat for American woodcock and other early successional forest dependent species (approximately 65 acres managed every 5 years). Approximately 155 additional acres of pasture, hay, grasslands, and shrublands would be managed to benefit woodcock or grassland-dependent breeding birds between the Nulhegan Basin, Pondicherry, Blueberry Swamp, Fort River, Salmon River, and Dead Branch Divisions. On the Nulhegan Basin Division we would continue to partner with Trout Unlimited to survey and evaluate barriers to fish passage, and prioritize and implement restoration projects. Table 4.6 provides a summary of habitat projects and targets that would continue on refuge lands.

In addition to ongoing management and restoration of refuge lands, under alternative A, refuge staff would continue to work with interested private landowners, State and local agencies, and organizations to help manage and restore habitats and wildlife populations on other ownerships through the Partners and/or Challenge Cost Share programs, or other available funding sources. A staff position working with Federal and State partners to pursue a coordinated private lands assistance program would continue as funds permit. This position was not funded until the end of fiscal year 2010, when it was made initially possible with funds from NRCS. The position is now funded solely by the refuge. The 1995 plan estimated that, on an annual basis, 50 Partners and Challenge Cost Share projects would be initiated with an emphasis on protecting and restoring wetlands and riparian habitats across the watershed, especially within SFAs. Initially, the goal was also to ensure that at least half of these projects would occur on dedicated or permanent open space. Unfortunately, this level of accomplishment has never been fulfilled to the extent planned, as funding levels for both the Partners and Challenge Cost Share programs have not been sustainable to meet the goal. In its early years, approximately $100,000 was available for distribution in the Challenge Cost Share budget for the refuge. In its last 2 years of implementation, years 2000 and 2001, 22 projects were funded each year, with an annual budget of approximately $89,000 and $75,000, respectively. The program has not been operational on the refuge since 2001 due to funding limits. However, under alternative A, the Service would continue to sustain partnerships with landowners, agencies, and organizations, subject to the availability of funds for these and other program priorities, in a concerted effort to assist where possible in implementing habitat restoration, population management, and other priority projects on both public and private lands.

The 1995 FEIS includes a focused effort targeting private landowners, State and local agencies, and private organizations to accomplish wildlife and habitat projects on land under their stewardship. This work continues through our Private Lands Coordinator. We have expanded the duties of this position to include recreation and education partnerships in the watershed.

Under alternative A, the refuge would continue to acquire lands in the existing approved acquisition boundary. We only purchase lands and conservation easements from willing sellers. Table 4.2 lists the existing SFAs and the total acreage we are approved for in each of these areas. These figures are based on the 1995 FEIS, plus additional expansions approved by subsequent NEPA-compliance documents. The Nulhegan Basin, Pondicherry, and Fort River Divisions were all expanded after the 1995 FEIS.

Table 4.2. Alternative A: Existing Approved Acquisition Acres by SFA

SFA Name	Total SFA Acres*
SFA 1a. Great Island Marshes	1,260
SFA 1b. Great Meadow	50
SFA 1c. Ragged Rock Creek	85
SFA 1d. Ferry Point	60
SFA 1e. Turtle Creek	20
SFA 1f. Lord Cove	700
SFA 1g. Essex Great Meadow	85
SFA 1h. Pratt and Post Coves	110

SFA Name	Total SFA Acres*
SFA 1i. Joshua Creek	25
SFA 1j. Deep River	70
SFA 1k. Chester Creek	90
SFA 1l. Whalebone Cove	150
SFA 2. Hamburg Cove/Eightmile River and East Branch	1,870
SFA 3. Burnham Brook	690
SFA 4. Selden Creek	340
SFA 5. Chapman Pond	365
SFA 6. Salmon Cove	1,790
SFA 7. Salmon River, including tributaries below dam	760
SFA 8. Pecausett Meadow	150
SFA 9. Round and Boggy Meadows/Mattabesset/Coginchaug River/Wilcox Island	300
SFA 10a. Deadmans Swamp	790
SFA 10b. Gildersleeve Island	80
SFA 10c. Wangunk Meadows	655
SFA 11a. Glastonbury Highlands	13,000
SFA 11b. Roaring Brook in Glastonbury	25
SFA 12. Great Meadows	4,085
SFA 13. South Windsor Meadows/Farmington Mouth	1,550
SFA 14. Farmington River and West Branch	215
SFA 15. Scantic River	490
SFA 16. Enfield Rapids/Kings Island	20
SFA 17. Honeypot Road Wetlands	600
SFA 18. Mt. Tekoa	3,000
SFA 19. Westfield Sandplain	400
SFA 20. Westfield River, including West Branch and Middle Branch	325
SFA 21. Chicopee River Mouth	115
SFA 22. Westover Airforce Base	365
SFA 23. Quaboag	1,200
SFA 24. Mt. Tom/Mill River/Holyoke Range	3,200
SFA 25. Grassland Complex	2,429*
SFA 26. Hatfield Oxbow	1,200
SFA 27. Whately Great Swamp	950
SFA 28. Mt. Toby	5,000

SFA Name	Total SFA Acres*
SFA 29a. Connecticut River-Turners Falls Dam to 116 Bridge in Sunderland	35
SFA 29b. Sawmill River to dam above Route 63	50
SFA 30a. Montague Plains	2,200
SFA 30b. Turners Falls Airport	250
SFA 31. Deerfield River, including most tributaries	940
SFA 32. Fall River in Massachusetts	30
SFA 33. Ashuelot River to Surry Mountain Dam, including the tributaries below the first dam	185
SFA 34a. Retreat Meadows	55
SFA 34b. Wantastiquet Mountain	4,600
SFA 35. West River, including Rock and Winhall Tributaries and Wardsboro Brook	350
SFA 36. Cold River	35
SFA 37. Williams River to Brockway Mills Dam	30
SFA 38. Macrosite, including the mouth of the Ompompanoosuc River	800
SFA 39. White River	615
SFA 40. Ammonoosuc and Wild Ammonoosuc Rivers	230
SFA 41. Pondicherry	6,677*
SFA 42. Victory Basin	870
SFA 43. Connecticut River--Murphy Dam to Northumberland Dam	420
SFA 44. Paul Stream	60
SFA 45. Nulhegan Basin	26,789*
SFA 46. Mohawk River	40
SFA 47. Colebrook Hill Farms	2,000
SFA 48. Indian Stream	180
Scattered rare species sites and important, scarce, and vulnerable wetlands	1,725†
Totals:	**97,830**

* *The acreage figures in this table are based off alternative D from the 1995 Final EIS, plus any additional expansions approved by subsequent NEPA-compliance documents. The Nulhegan Basin, Pondicherry, and Fort River Divisions were all expanded after the 1995 Final EIS.*

† *In the 1995 Final EIS, there was an addition error in the total acres for alternative D. To compensate for this error, we reduced the acreage allocated to "scattered rare species sites" and "important, scarce, and vulnerable wetlands."*

Environmental Education, Interpretation, and Outreach

Limited environmental education and interpretation programming would continue on refuge lands. The programs would be conducted by refuge staff on an opportunistic basis as funding allows. While we would continue to encourage the use of refuge lands for self-led programs, most of our efforts in support of education and interpretive programs would continue to be done in cooperation with partners in the partner-owned visitor facilities discussed below.

Other outreach efforts have focused on providing students and local communities with environmental and interpretive programs. In chapter 3 we describe several refuge programs that would continue under alternative A including the WOW Express, Adopt-a-Habitat program, an urban refuge initiative, the BAT, and Conte Corners. We would also continue our beneficial relationship in partner-owned visitor facilities including the Great Falls Discovery Center, the Great Northwoods Center, and the Montshire Museum of Science. We would also continue existing partnerships with organizations such as Vermont Institute of Natural Science, Springfield Museums, and Connecticut River Museum, and develop new partnerships as appropriate. We would augment these efforts subject to the availability of funds, and by the establishment of a Partners position and/or by a reinvigorated Challenge Cost Share program, and by working with partners to pursue indoor and outdoor environmental education curriculum development that would meet respective State education standards.

Recreation

The Service would continue to have sole responsibility for managing and regulating public use and access on all refuge units and divisions acquired in fee title or as allowed by an easement under this alternative. Some restrictions on public use and access would occur on these lands, especially the small, scattered sites being protected for federally listed endangered, threatened, candidate, and rare or uncommon species or communities, in order to assure the purposes for the acquisition were accomplished. Recreational uses allowed would be managed to avoid damage to habitat or disturbance to wildlife of concern. Hunting, fishing, wildlife observation, and photography are priority recreational uses to permit in areas where determined to be compatible with refuge management and consistent with applicable laws and policies. These and all other recreational uses that we would continue to allow under alternative A are described in chapter 3. A summary is presented in table 4.5. The maps (maps 4.41 to 4.49) at the end of the chapter depict existing public use on Pondicherry and Nulhegan Basin Divisions, the two largest existing refuge divisions. There are additional public use maps for other divisions included in appendix A. Managing or regulating public use and access on lands protected by Service easements or cooperative management agreements would be determined by the level of interest the Service acquired, which would have been negotiated with the landowner.

The Service would continue to work with landowners, who have projects funded through the Partners or Federal grant programs, and who voluntarily support public use and access on their lands, to determine the types and levels of use that would help promote the purposes of the Conte Refuge Act.

Partnerships

Diverse and effective partnerships with the Friends of Conte Refuge, Federal, State and local agencies, landowners, and the public would continue to be the backbone for implementing the full suite of refuge activities currently underway and planned in the 1995 FEIS. This includes activities on refuge lands and throughout the watershed. Appendix N provides a list of the many and varied partners that refuge staff are currently involved with. We would continue to develop new partnerships, with special effort to promote conservation education and outreach programs in urban areas within the watershed through our Urban Refuge initiative. Subject to the availability of staffing and funds, efforts to develop partnerships to implement priority conservation projects through the Partners for Fish and Wildlife Program and Challenge Cost Share programs, or other Federal grant programs, would continue to be an important part of this alternative.

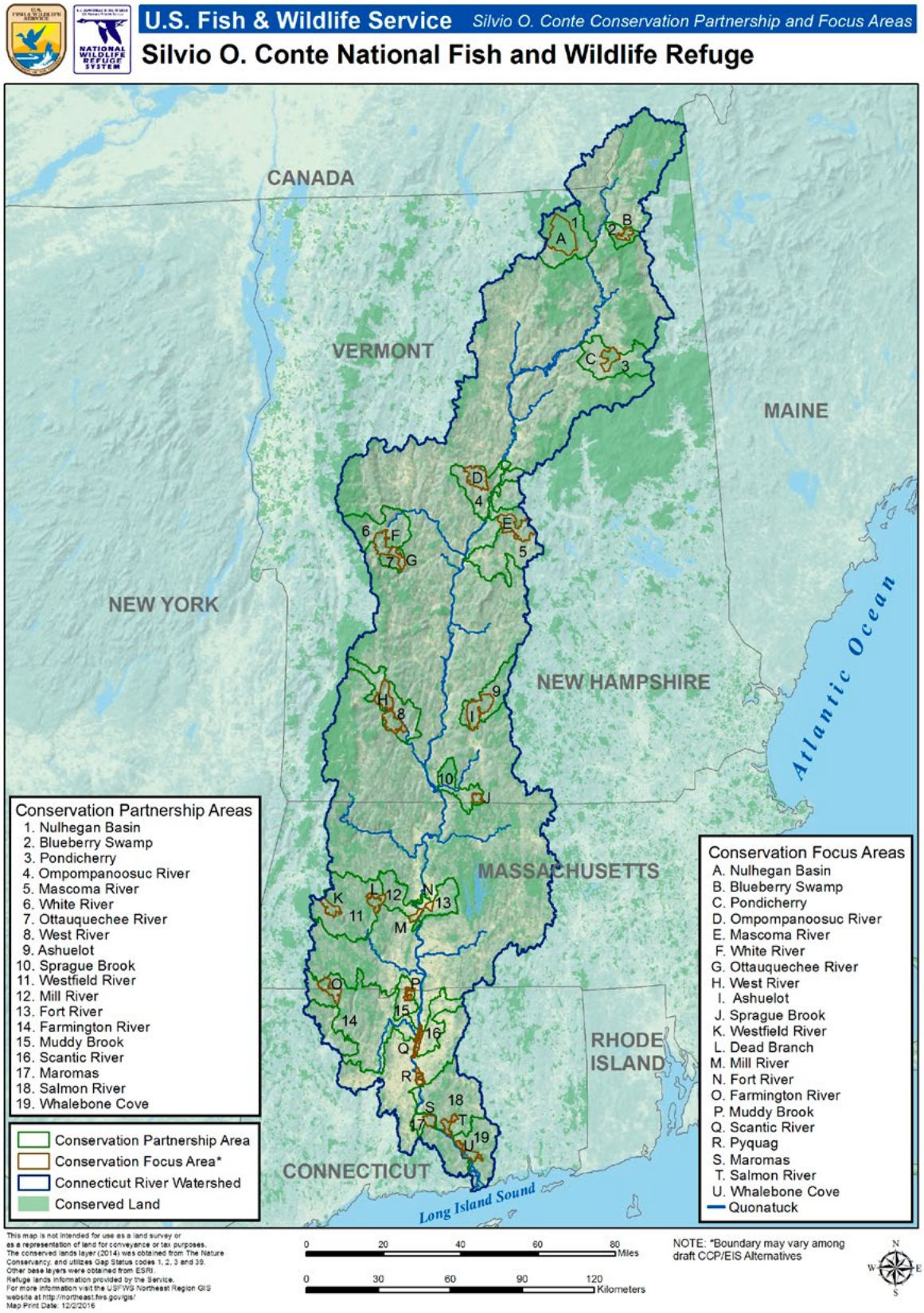
Alternative B–Consolidated Stewardship

Under alternative B, we propose to meet the wildlife and habitat conservation, environmental education, interpretation and outreach, recreation, and partnership goals for the watershed as described in the section below titled "Actions Common to Alternatives B, C, and D." Many of our existing programs would continue, but we would focus our effort and attention in geographic areas we are calling CPAs. This alternative identifies 17 CPAs that are distributed throughout the watershed (see map 4.1 and table 4.2). Maps 4.3 to 4.19 show the individual CPAs. CPAs are relatively large areas, generally defined along a subwatershed boundary, roughly corresponding with some combination of 12 digit hydrologic units codes USGS HUCs (*http://nh.water.usgs.gov/projects/ct_atlas/water_wsheds_huc.htm*; accessed August 2016). Refuge staff, other Service programs, our State partners, and resource experts identified CPAs as areas comprising concentrations of habitats important to Federal trust resources and State species of greatest conservation concern need while also providing important opportunities to protect connections between areas of high conservation value. Within CPAs, we would plan to concentrate our limited resource expenditures (e.g., staff, funds, equipment) and help facilitate the work of our partners consistent with our goals and objectives for the watershed and refuge purposes. In many instances, the Service would serve a supporting role in partner-led efforts on other ownerships in CPAs. It is not assumed that refuge or Service staff would take the lead role in all conservation activities in CPAs. In summary, CPAs would be geographic areas of emphasis for refuge staff to support and facilitate the activities of our partners that contribute to regional conservation goals, and refuge purposes and goals, and which complement management of refuge lands.

Table 4.3. Conservation Partnership Areas (CPAs) by Alternative Proposed in the Conte Refuge CCP

CPAs Proposed under Alternative A	CPAs Proposed under Alternative B	CPAs Proposed under Alternatives C and D
There are no CPAs under Alternative A	Ashuelot River	Ashuelot River
	Blueberry Swamp	Blueberry Swamp
	Farmington River	Farmington River
	Fort River	Fort River
	Maromas	Maromas
	Mascoma River	Mascoma River
	Mill River	Mill River
	-	Muddy Brook
	Nulhegan Basin	Nulhegan Basin
	Ompompanoosuc	Ompompanoosuc
	-	Ottauquechee River
	Pondicherry	Pondicherry
	Salmon River	Salmon River
	Scantic River	Scantic River
	-	Sprague Brook
	West River	West River
	Westfield River	Westfield River
	-	White River
	Whalebone Cove	Whalebone Cove

Map 4.1. Proposed Conservation Partnership Areas and Conservation Focus Areas



* *Some CFA boundaries vary by alternative. Not all CPA/CFAs appear in alternatives A and B. This map represents Alternative C. For more detailed maps of each CFA see the end of this chapter.*

Within CPAs, we are proposing nesting one or more smaller CFAs (map 4.1). The maps (maps 4.20 to 4.40) at the end of the chapter depict the individual CFAs under each alternative, including alternative B. It is within CFAs, where Federal trust resource values are particularly high, that we would focus on acquiring a Service interest in land from willing sellers in either fee, easement, lease, or cooperative management agreement.

Under alternatives B, we propose to move away from small, scattered SFAs to larger, more biologically sound and ecologically resilient CFAs. The total refuge acquisition acres are similar under alternatives A and B (table 4.5). However, we would reconfigure the refuge's approved acquisition totals for the SFAs into CFAs. Table 4.4 shows relationship of SFAs identified in the 1995 FEIS to the CFAs proposed in alternatives B, C, and D. For each proposed CFA, the table lists what, if any, SFAs are located within that area. This concentration and consolidation of refuge lands would enhance our implementation of the Service's strategic habitat conservation initiative, and better support other conservation priorities detailed in Service, ecoregional, and State wildlife action plans listed in appendix M.

The CPA/CFA configuration would also dramatically improve opportunities to accomplish the Service's climate change adaptation strategies, priorities of the NALCC, respective state wildlife action plan priorities, and other public and private partner landscape initiatives.

Once land is acquired in a CFA for the refuge, we would administratively establish and refer to that area as a refuge division. For example, the Farmington River CFA would become known as the Farmington Division of the Conte Refuge, should an interest in land be acquired by the Service in that area.

Realistically, we do not expect that we would acquire 100 percent of the lands identified in each CFA for a variety of reasons (e.g., landowner preferences, protection by other conservation organizations, changes in land use, impacts on farming and forestry, etc.). We propose that the Service would only acquire approximately 90 percent (90%) of the area within CFAs on average; and the remaining 10 percent (10%) of our proposal would come from the surrounding CPA. In appendix C we describe the criteria used to delineate and refine CFAs and would be used to guide the 10 percent (10%) land acquisition authority that would lie outside of delineated CFAs, but within CPAs. As we acquire lands, we would strive to protect Federal trust resources and promote connections among a diversity of habitats covering a range of elevations, latitudes, aspect, and processes.

Table 4.4. Relationship Between Proposed CFAs and the 1995 SFAs

CFA Name	SFA Name
Ashuelot River CFA	No SFAs
Blueberry Swamp CFA	SFA 46. Mohawk River SFA 47. Colebrook Hill Farms
Dead Branch CFA	SFA 20. Westfield River, including West Branch and Middle Branch (Also partially in the Westfield River CFA)
Farmington River CFA	No SFAs
Fort River CFA	SFA 25. Grassland Complex
Mill River CFA	SFA 24. Mt. Tom/Mill River/Holyoke Range

CFA Name	SFA Name
Maromas CFA	No SFAs
Mascoma River CFA	No SFAs
Nulhegan Basin CFA	SFA 45. Nulhegan Basin
Ompompanoosuc CFA	No SFAs
Ottauquechee River CFA	No SFAs
Pondicherry CFA	SFA 41. Pondicherry
Pyquag CFA	SFA 12. Great Meadows
Quonatuck CFA	SFA 1a. Great Island Marshes SFA 1b. Great Meadow SFA 1d. Ferry Point SFA 1e. Turtle Creek SFA 1f. Lord Cove SFA 1g. Essex Great Meadow SFA 1h. Pratt and Post Coves SFA 1j. Deep River SFA 1k. Chester Creek SFA 8. Pecausett Meadow SFA 9. Round and Boggy Meadows/Mattabesset/Coginshaug River/ Wilcox Island SFA 10a. Deadmans Swamp SFA 10b. Guildersleeve Island SFA 10c. Wangunk Meadows SFA 14. Farmington River and West Branch SFA 16. Enfield Rapids/Kings Island SFA 21. Chicopee River Mouth SFA 26. Hatfield Oxbow SFA 29a. Connecticut River-Turners Falls Dam to 116 Bridge in Sunderland SFA 29b. Sawmill River to dam above Route 63 SFA 33. Ashuelot River to Surry Mountain Dam, including the tributaries below the first dam SFA 34a. Retreat Meadows SFA 35. West River, including Rock and Winhall Tributaries and Wardsboro Brook SFA 38. Macrosite, including the mouth of the Ompompanoosuc River SFA 39. White River SFA 43. Connecticut River--Murphy Dam to Northumberland Dam
Muddy Brook CFA	No SFAs
Salmon River CFA	SFA 6. Salmon Cove SFA 7. Salmon River, including tributaries below dam
Scantic River CFA	SFA 13. South Windsor Meadows/Farmington Mouth SFA 15. Scantic River
Sprague Brook CFA	No SFAs

CFA Name	SFA Name
West River CFA	No SFAs
Westfield River CFA	SFA 20. Westfield River, including West Branch and Middlebranch (Also partially in the Dead Branch CFA)
Whalebone Cove CFA	SFA 1i. Joshua Creek SFA 1l. Whalebone Cove SFA 2. Hamburg Cove/Eightmile River and East Branch SFA 4. Selden Creek SFA 5. Chapman Pond
White River CFA	No SFAs
SFAs that do not occur in any CFA	SFA 1c. Ragged Rock Creek SFA 3. Burnham Brook SFA 11a. Glastonbury Highlands SFA 11b. Roaring Brook in Glastonbury SFA 17. Honeypot Road Wetlands (Existing refuge unit) SFA 18. Mt. Tekoa SFA 19. Westfield Sandplain SFA 22. Westover Airforce Base SFA 23. Quaboag SFA 27. Whately Great Swamp SFA 28. Mt. Toby (A portion of this is an existing refuge unit) SFA 30a. Montague Plains SFA 30b. Turners Falls Airport SFA 31. Deerfield River, including most tributaries SFA 32. Fall River in Massachusetts SFA 34b. Wantastiquet Mountain SFA 36. Cold River SFA 37. Williams River to Brockway Mills Dam SFA 40. Ammonoosuc and Wild Ammonoosuc Rivers SFA 42. Victory Basin SFA 44. Paul Stream SFA 48. Indian Stream

Table 4.5 lists the potential total acres that would fall under Service ownership within in each respective CFA by alternative. The acreage figures presented for each alternative include the acres already owned by the Service. The table also lists the amount of acres in each proposed CFA that are already conserved by others. We do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances. In all situations, we only purchase lands from willing sellers.

Table 4.5. Potential Refuge Ownership Under Each Alternative

		Alternative A		Alternative B			Alternative C			Alternative D	
Conservation Focus Area (CFA)/ Refuge Unit Name	Acres Currently Owned by Service[1]	Potential Acres Under Service Ownership[3]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]
Nulhegan Basin CFA	26,605	26,789	28,128	353	27,775	33,132	353	32,779	33,132	353	32,779
Blueberry Swamp CFA	1,166	2,040	1,996	0	1,996	4,636	0	4,636	6,662	161	6,501
Pondicherry CFA	6,443	6,677	6,714	0	6,714	10,249	0	10,249	10,520	0	10,520
Ompompanoosuc CFA	0	0	4,464	0	4,464	15,383	311	15,072	15,383	311	15,072
White River CFA	0	0	0	0	0	11,298	1,244	10,054	16,384	1883	14,501
Ottauquechee River CFA	0	0	0	0	0	5,985	0	5,985	10,017	1496	8,521
Mascoma River CFA	761	761	9,284	0	9,284	22,531	1,938	20,593	22,531	1938	20,593
West River CFA	0	0	11,243	1,488	9,755	25,965	3,018	22,947	25,965	3018	22,947
Ashuelot CFA	0	0	7,961	809	7,152	21,085	3,225	17,860	21,085	3225	17,860
Sprague Brook CFA	0	0	0	0	0	3,306	290	3,016	9,196	728	8,468
Westfield River CFA	125	225	4,337	571	3,766	7,339	1,162	6,177	15,838	6323	9,515
Dead Branch CFA	98	100	1,565	651	914	6,998	1,812	5,186	6,998	1812	5,186
Mill River CFA	249	3,200	2,115	826	1,289	3,231	931	2,300	3,231	931	2,300
Fort River CFA	261	2,429	2,075	580	1,495	2,274	614	1,660	3,072	770	2,302
Farmington River CFA	0	0	5,953	542	5,411	9,938	2,277	7,661	24,826	8831	15,995
Muddy Brook CFA	0	0	0	0	0	2,747	86	2,661	2,747	86	2,661
Scantic River CFA	0	2,040	2,556	416	2,140	4,610	466	4,144	4,610	466	4,144
Pyquag CFA	0	4,085	3,712	383	3,329	3,712	383	3,329	3,712	383	3,329
Maromas CFA	0	0	2,067	128	1,939	4,335	400	3,935	4,335	400	3,935
Salmon River CFA	468	2,550	2,495	124	2,371	5,519	1,064	4,455	5,519	1064	4,455
Whalebone Cove CFA	116	2,750	3,111	1,341	1,770	6,977	3,047	3,930	20,356	9341	11,015
SFAs outside of CFAs & Small Scattered Sites		35,704									
Quonatuck CFA	0	8,480	5,500		5,500	8,000		8,000	8,000		8,000
Hatfield Unit	19	19	19		19	19		19	19		19

Conservation Focus Area (CFA)/ Refuge Unit Name	Acres Currently Owned by Service[1]	Alternative A		Alternative B			Alternative C			Alternative D	
		Potential Acres Under Service Ownership[3]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]	Total Acres	Existing Acres Permanently Conserved by Others[3]	Potential Acres Under Service Ownership[4]
Saddle Island Unit	2	2	2		2	2		2	2		2
Putney Mountain Unit	285	285	285		285	285		285	285		285
Wissatinnewag Unit	21	21	21		21	21		21	21		21
Third Island Unit	4	4	4		4	4		4	4		4
Fannie Stebbins	98	98	98		98	98		98	98		98
Mount Toby Unit	30	30	30		30	30		30	30		30
Mount Tom Unit	141	141	141		141	141		141	141		141
Honeypot Road Wetlands Unit	21	21	21		21	21		21	21		21
Deadman's Swamp Unit	31	31	31		31	31		31	31		31
Roger Tory Peterson Unit	56	56	56		56	56		56	56		56
Totals	**37,000[2]**	**97,830**			**97,772**			**197,337**			**231,307**

[1] *Total as of February 2016*

[2] *Under alternative A, the 708 acres of existing units are accounted for in the CFAs.*

[3] *Existing conserved land acreages were calculated using TNC's 2014 secured lands layer, Gap Status 1, 2, 3, and 39 (see: https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/secured/Pages/default.aspx).*

[4] *Includes acres currently owned by Service. These totals represent the estimated maximum acreage the Service would conserve associated with each CFA. We are requesting authority to acquire approximately 90% of total acreage, on average, within CFAs, and the reminaing 10% in surrounding CPAs (see maps in chapter 4). We only purchase lands from willing sellers and do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances.*

Additional discussion on alternative B by major resource program is provided below. Later in this chapter, the sections titled "Actions Common to All Alternatives" and "Actions Common to Alternatives B, C, and D" includes other major components of this alternative. The latter section describes our desired future conditions, programs, and priorities for conservation activities in the watershed, with particular focus in CPAs. Final CCP/EIS appendix A, which details management direction on current and proposed refuge lands (e.g., existing refuge divisions and units, and the proposed CFA network) under the Service-preferred alternative C, also represents management direction for alternative B on its smaller land base. Proposed staff to implement alternative B is included as appendix H. Table 4.6 provides a summary of current and planned activities under alternative B in comparison to the other action alternatives.

In summary, the complete description of alternative B management direction is the combination of the discussion immediately following, along with:

- The section below in this chapter titled "Actions Common to All Alternatives."
- The section below in this chapter titled "Actions Common to Alternatives B, C, and D."
- The summary table 4.6 at the end of this chapter.
- Appendix A of this final CCP/EIS (except the four CFAs not included in alternative B: White River, Ottauquechee River, Sprague Brook, and Muddy Brook CFAs).

Wildlife and Habitat Conservation

Opportunities to conduct habitat management is greatly expanded under alternative B compared to alternative A, in particular, where the consolidated and larger land base, configured around the network of CFAs and other conserved lands under alternative B, allows more flexibility and creates more efficiencies than the SFA configuration. Further, benefits from other conserved properties will accrue to refuge administered lands. Under alternative B, we would continue to protect and restore habitat for Federal listed species, but would also expand our focus to enhance habitat for other species of conservation concern. We have identified priority refuge resources of concern for each CFA in appendix A, many of which are also NALCC representative species. After acquiring a manageable unit, and inventorying and assessing habitat conditions in the field, we would develop detailed habitat management plans (HMPs) for each CFA to show how we plan to manage for those resources. In particular, floodplain forest and riparian habitat protection and restoration would be a focus under alternative B due to the wide variety of terrestrial and aquatic resources of concern that would benefit from that management.

Off refuge lands, we would continue to work in partnership with Federal and State agencies, communities, organizations, and landowners to accomplish the watershed-wide objectives for wildlife and habitat conservation that we identify in the section "Actions Common to Alternatives B, C, and D." However, we would concentrate our partnership efforts in CPAs, seeking to collaborate and leverage funds, labor, and general capacity. Expanded emphasis would be on sharing resource information among partners, leveraging Federal grants and other State and private lands assistance programs, and cooperating on developing baseline inventories, monitoring resources, and implementing NALCC priorities.

Environmental Education, Interpretation, and Outreach

With respect to environmental education, interpretation, and outreach, we would expand the initiatives currently underway under alternative A. Emphasis would be added on continuing existing educational programs within all four States on a community by community basis, but especially making refuge programs more relevant to urban communities through the Refuge System's Urban Initiative.

S. Maslowski/USFWS

Bobolink

We would make refuge environmental education assets, strategies, and curriculum available on a community basis by visiting schools, fairs, summer camps, and special events. The BAT trailer would become fully operational and the WOW Express, Conte Corners, and the Adopt-a-Habitat programs would all be expanded to support our education, outreach, and interpretation goals and objectives.

Recreation

Under alternative B, we would continue the commitment to create and maintain public access opportunities on refuge lands for compatible recreational uses. In the section "Actions Common to Alternatives B, C, and D Only", the goal 3 discussion provides detailed objectives for hunting, fishing, wildlife observation and photography, and other compatible recreational activities. Our emphasis would be on providing diverse and well-maintained trail systems, roads, and other supportive infrastructure for people of all abilities to facilitate an appreciation of refuge lands, the mission of the Refuge System, and overall outdoor recreational opportunities. Within CPAs, we would work with partners to enhance regional land- and water-based trail networks, especially those with National and State designations. We would support partner efforts to make trail connections where compatible, protect the integrity of these features, and provide access and infrastructure for people of all abilities, in order to encourage responsible use and enjoyment of natural resources.

The maps (maps 4.41 to 4.49) at the end of the chapter depict the proposed public use on Pondicherry and Nulhegan Basin Divisions, the two largest existing refuge divisions, under alternatives B and C. There are additional public use maps for other divisions included in appendix A.

Partnerships

We would continue the valuable partnerships we currently have, but would also look to seek new ones, or expand existing ones in CPAs that would advance our goals and those of our priorities. Our emphasis would be on looking for opportunities to coordinate, collaborate, and leverage Federal resources in accomplishing conservation, education, and recreation goals. We would make a concerted effort to engage other Federal agencies in order to maximize opportunities to assist State and private landowners in meeting mutually beneficial conservation priorities. We would also actively seek opportunities to enhance research, inventories, and monitoring that would advance our understanding of the watershed's resources on a landscape basis, and support science-based decision-making. We would work with partners to implement priorities identified by the NALCC and State WAPs, and coordinate efforts to respond to the challenges associated with a changing climate, land uses, and other landscape-level issues such as invasive species.

Alternative C– Enhanced Conservation Connections and Partnerships–The Service-preferred Alternative

This is the Service's preferred alternative because it expands on the benefits identified for alternative B based, in large part on our strategy to promote areas more resilient to the stressors associated with climate change and land use changes at the CPA levels, as well as within the larger watershed. This approach would approximately double the approved acquisition boundary for the refuge. Alternative C incorporates the same goals, objectives, and strategies as alternative B; however, it significantly increases opportunities to accomplish them by seeking authority to acquire a total of 197,337 acres for the refuge on 22 CFAs encompassed within 19 CPAs. Lands identified would be acquired from willing sellers only. Fee title, easements, leases, and cooperative management agreements would all be acquisition options available.

Compared to alternative B, the CFAs and CPAs under alternative C are generally larger, and new ones are added (4 and 3, respectively). Their size and distribution under alternative C are strategic for protecting core habitat areas for Federal trust resources, facilitating habitat connections for both terrestrial and aquatic species, and increasing the diversity in area, elevation, latitude, and aspect of habitats, and the diversity of ecological processes occurring on habitats represented in the watershed's current 1.8 million-acre conserved lands network. Further, they would promote representation, redundancy, and resiliency in the landscape to provide flexibility in adapting to climatic and landscape change. Similar to alternative B, once land is acquired for the refuge, we would administratively establish a refuge division.

The maps (maps 4.20 to 4.40) at the end of the chapter depict the CPAs and CFAs under each alternative, including alternative C.

The refuge's strategy for contributing to the conserved lands network is not only to protect crucial habitat and habitat connections for Federal trust resources as noted above, but is also based on an assertive strategy to address landscape threats associated with climate, land use, and demographic changes predicted for the watershed. For example, in conjunction with other conserved lands, CFAs would protect areas in anticipation of the landward migration of coastal wetlands predicated under climate change, and would generally provide more diverse opportunities for the successful emigration and adaption of flora and fauna with any environmental changes (e.g., allow for movement in area, elevation, latitude, and aspect). Further, compared to alternatives A and B, this expanded land base makes a more significant and sustainable contribution toward meeting the refuge's goals, objectives, and legislated purposes, and in supporting respective State WAPs and NALCC priorities.

Appendix C is the proposed land protection plan for the refuge under alternative C. Acquisition would be from willing sellers only. It proposes that approximately 90 percent of target acreage authority, on average, would be acquired in CFAs, and the remaining 10 percent of the acreage authority would occur within CPAs. Acquisition outside of CFAs would occur be in coordination with respective municipalities, the State, and abutting landowners. The criteria for acquisition outside of CFAs are the same as that defined for CFAs. Appendix C provides details on the process used to select CFAs, what approvals are being sought, the national policies and procedures the Service would employ for expanding the refuge, what tracts are under consideration and how we have prioritized them, and what acquisition methods and options would be available if approval is granted and there are willing sellers.

In summary, the complete description of alternative C management direction is the combination of the discussion immediately following, along with:

- The section below in this chapter titled "Actions Common to All Alternatives."

- The section below in this chapter titled "Actions Common to Alternatives B, C, and D."
- The summary table 4. 6 at the end of this chapter.
- This final CCP/EIS's appendixes A, B, C, D, and G.

Wildlife and Habitat Conservation

Appendix A details management objectives and strategies that would be implemented for each CFA under alternative C. As we described for alternative B, priority refuge resources of concern, many of which are also North Atlantic LCC representative species, are identified for each CFA. Our process for selecting those priority resources is detailed in appendix B. We would develop detailed step-down HMPs for each CFA to show how we plan to manage for those resources and how we will inventory and monitor habitat conditions. The HMPs will provide more detailed, specific, and quantifiable objectives and clear management strategies. For more established refuge divisions (e.g., larger existing refuge divisions or where we have owned and managed land for a while), in appendix A, we provide a higher level of detail on management strategies that would be incorporated into HMPs since we already know more about those areas. Wherever we identify acres for management, these are rough approximations and will be refined in subsequent HMPs.

In CPAs, we would continue to support our partners land protection efforts with an underlying goal to strive for the protection of important core habitat areas and establish connections between them. For example, one objective in forest habitats would be to strive to conserve contiguous forest blocks of at least 15,000 acres in the southern half of the watershed, and contiguous forest blocks of 25,000 acres in the northern half of the watershed. These sizes are estimated to be the minimum to retain adequate resiliency and withstand catastrophic events, and big enough to support breeding populations for migratory bird species of conservation concern (TNC 2004). Restoration of riparian and floodplain forest, and removing barriers and improving passage for aquatic species, would be priority activities we would also actively support.

Environmental Education, Interpretation, and Outreach

With respect to environmental education, interpretation, and outreach, we would expand the initiatives currently underway under alternative A, as well as those proposed under alternative B. The main appreciable difference from those alternatives is the increased opportunities afforded by the expanded and well distributed land base proposed under alternative C and the increased connections with more communities and their residents. Implementing the Refuge System's Urban Initiative would be a major focus, as would maintaining our existing relationships with partner-owned environmental education and interpretive facilities, and expanding such efforts to new partners.

Recreation

Under alternative C, we would continue to provide recreational access opportunities at all refuge divisions, which represents a much larger land base than under alternatives A and B. We would provide a level of development at each refuge division (e.g. contact facility, parking area, trails, kiosk, interpretation, education facilities or stations, etc.) commensurate with the level of use we anticipate and can accommodate, which overall, would represent an increase over alternative B. We would increase our commitment to provide access to refuge lands for people of all abilities to engage in compatible recreational uses. Providing public access to the Connecticut River for responsible use and enjoyment would be a priority. Table 4.6 summarizes objectives for priority public uses and other recreational activities that would be offered under alternative C.

The maps (maps 4.41 to 4.49) at the end of the chapter depict the proposed public use on Pondicherry and Nulhegan Basin Divisions, the two largest existing refuge divisions, under alternatives B and C. There are additional public use maps for other divisions included in appendix A.

Partnership

Under Alternative C, our partnership strategies would build off those in alternative B which are highlighted in the goal 4 discussion below and in the section "Actions Common to Alternatives B, C, and D Only." The partnerships and program priorities would essentially be the same. However, under alternative C, the capacity of refuge lands to influence conservation in the watershed, and the visibility and relevancy of the refuge as a partner across the 396 communities and 2.4 million residents in the watershed would be greatly enhanced with the larger land base.

Alternative D–Reduced Management with Emphasis on Backcountry Recreation

Alternative D proposes the largest refuge expansion of the all the alternatives. We would seek approval to expand the refuge boundary to a total of 231,307 acres. That represents an increase of 133,477 acres over existing approvals under alternative A. Alternative D includes the same conservation design concept of CPAs and CFAs as alternative C, but also includes additional flexibility (in the form of approximately 33,540 acres more than alternative C) for the Service to acquire lands that connect CPAs and CFAs. The ecological benefits to the watershed's conserved lands network would be notably enhanced from those described for alternative C due to the proposed larger land protection strategy. That expanded land base would include the proportionate increase in capability to promote representation, redundancy, and resiliency of refuge habitats via connectivity and diversity in area, elevation, latitude, aspect. It would also be better able to address landscape-scale threats and issues such as climate, land use, and demographic changes.

The maps (maps 4.20 to 4.40) at the end of the chapter depict the CFAs under each alternative, including alternative D.

Refuge land management under alternative D would be dramatically different than proposed under the other alternatives. This alternative would significantly reduce active habitat management, and would minimize public access infrastructure. The overriding management philosophy under this alternative is to allow natural habitat functions and processes to proceed on refuge lands without human intervention or impact from human activities, except in response to or prevention of a catastrophic threat. As such, with regard to public use and access on the refuge, alternative D would result in a reduced human footprint, including visitor infrastructure, and would emphasize backcountry, non-motorized and low-density, primitive public use opportunities.

Outside of refuge lands, our priorities for engaging in partnerships within CPAs would be similar to alternative C.

Wildlife and Habitat Conservation

With the exception of responding to catastrophic threats and events, habitat management on refuge lands would generally be focused only on controlling invasive pests and conducting limited restoration activities where continued degradation is expected to otherwise impede natural processes. Floodplain forest restoration and dam removal are examples of activities that might occur to manage severe habitat degradation. Off refuge lands, we would continue to support partners' priorities for habitat and land management that is consistent with our mission, goals, and priorities, including where active management would be necessary to meet their priorities.

Environmental Education, Interpretation, and Outreach

Alternative D would primarily differ from the other alternatives in how these programs would be implemented on refuge lands. Activities on refuge lands would be tempered to conform to an overall low impact, backcountry, and limited development approach to management. For example, interpretive trails, overlooks, kiosks, outdoor classrooms, and parking areas would not be expanded

and those that exist today may be removed rather than maintained when major repair is required.

Recreation

Under alternative D, we would continue to promote public access to refuge lands for compatible recreational uses as outlined in the previous alternatives. However, there would be a distinct difference in the amount of infrastructure and investment of resources to support those activities on refuge lands. And, restrictions on motorized vehicles would also be implemented. In general, facilities to support recreational uses would be substantially less. Table 4.6 summarizes objectives for priority public uses and other recreational programs that we would allow under alternative D. As indicated above, this alternative would promote backcountry, non-motorized and low-density, pedestrian public use opportunities. Snowmobiling would no longer be allowed under alternative D. We would also only allow motor vehicle use on primary roads, and eliminate that use on secondary roads. There would be minimal signage on roads and trails, providing only that quality of access which is necessary for safety and a quick orientation.

The maps (maps 4.41 to 4.49) at the end of the chapter depict the proposed public use on Pondicherry and Nulhegan Basin Divisions, the two largest existing refuge divisions, under alternative D. There are additional public use maps for other divisions included in appendix A.

Partnerships

Under alternative D, our strategy to establish, support, and maintain partnerships would be the same as those under alternative C. However, due to reduced active habitat management, restrictions on motorized activities, and reduced infrastructure proposed under this alternative, partnership opportunities with certain user groups, and/or organizations interested in active management on the refuge, would be reduced.

Actions Common to All Alternatives

All of the alternatives share some common actions. Some are required by law or policy, or represent NEPA decisions that recently have gone through public review, and agency review and approval. Others may be administrative actions that do not necessarily require public review, but we want to highlight them in this public document. They may also be actions we believe are critical to achieving the refuge's purposes, vision, and goals. These actions include:

- Partnerships.
- State Fish and Wildlife Agency Coordination.
- Community Relations.
- Grants Program.
- Urban Wildlife Refuge Partnerships.
- Land Stewardship Outreach.
- Land Conservation and Protection.
- Agricultural and Forest Lands Protection.
- Rare and Exemplary Natural Communities.
- Adaptive Management.
- Research.

- Inventory and Monitoring Program.
- Integrated Pest and Invasive Species Control.
- Refuge Staffing and Administration.
- Youth Conservation Corps.
- Volunteers.
- Refuge Operating Hours.
- Refuge Step-down Plans (e.g., HMPs, Visitor Services Plans, Fire Management Plans, etc.).
- Environmental Education, Interpretation, and Outreach.
- Hunting and Fishing.
- Appropriateness and Compatibility Determinations.
- Activities Not Allowed.
- Permitting Special Uses.
- Commercial and Economic Uses.
- Removing Unnecessary Structures and Site Restoration.
- Cabin Leases at Nulhegan Basin Division.

Bird banding at Nulhegan Basin Division

Ryan Hagerty/USFWS

- Boating Access.
- Furbearer Management.
- Fire Management.
- Expanding the Pondicherry National Natural Landmark.
- Cultural Resource Protection.
- Endangered Species Act Section 7 Consultations.
- Wilderness Review.
- Wild and Scenic Rivers Review.
- Distributing Refuge Revenue Sharing Payments.
- Silvio O. Conte Refuge Advisory Council.

Partnerships

Under all alternatives, we would continue to maintain the existing partnerships identified in appendix N, while seeking new ones. These relationships are vital to our success in managing all aspects of the refuge, from conserving land, to managing habitats and protecting species, to outreach and education, and providing compatible wildlife-dependent recreation. Their importance is

so paramount, we have dedicated goal 4 to highlight the present and future partnerships. The respective State wildlife agencies and partners comprising the Friends of Conte have been particularly important and valued conservation allies. We would continue to work collaboratively with existing partners and pursue new relations in areas of mutual interest that benefit refuge priorities. We highlight several partnership elements below. Implementing this program supports all refuge goals, with particular emphasis on goal 4 and the conservation and management of wildlife resources through partnerships.

State Fish and Wildlife Agency Coordination

Under all alternatives, refuge staff would continue to coordinate with the four respective State wildlife agencies in areas of mutual interest, including the protection of Federal and State listed species and other species of concern, hunting and fishing seasons and regulations, wildlife and aquatic habitat management projects (including aquatic species passage) both on and off refuge lands, environmental education, and land protection. This close coordination is grounded in the 1997 Refuge Improvement Act and Service policy (601 FW 7) directing "early and close coordination and cooperation" with our State counterparts in a "timely and effective manner." State coordination and cooperation is an emphasis in the recommendations from the 2011 Refuge System vision conference, "Conserving the Future: Wildlife Refuges and the Next Generation."

It is a clear imperative that refuges should coordinate with States when involved in planning efforts of mutual interest, including CCPs, habitat management plans, and hunting and fishing plans, as examples. The CCP process is specifically mentioned in 601 FW 7 policy as a Service action requiring close collaboration with affected States. Furthermore, the policy directs we ensure that Refuge System regulations and management plans are, to the extent practicable, consistent with respective similar State laws, regulations, and management plans. We would also continue to work with the States as they develop and implement their respective wildlife action plans. Finally, Presidential Executive Order #13443–Facilitation of Hunting Heritage and Wildlife Conservation, directs the Service to work with state fish and wildlife agencies to manage wildlife and habitats to foster healthy and productive populations and provide appropriate opportunities for hunting those populations. Close coordination with State agencies supports all four refuge goals.

Community Relations

Under all alternatives, we would continue to meet and work with community leaders, elected officials, local landowners, and the public. This remains a challenge given the small staff and landholdings spread across more than 300 miles in four states. However, we will continue to strive to maintain a good line of communications within each of the communities where the refuge is working. Enhanced community relations would help support all refuge goals. The WoW Express, BAT, Adopt-a-Habitat, open houses, and a range of public access facilities and opportunities will be employed to accomplish refuge purposes and strengthen community ties to the refuge.

Grants Program

Under all alternatives, the administrative capability to implement a grants program would remain in place so that refuge staff could award grants through the Partners program or through other grant funds should funds become available. At this time, no funding is available and the forecast for future funding is very uncertain. As we described under alternative A, the 1995 FEIS included an important program for awarding CCS grants and Partners program monies to fund projects for conservation, education, recreation, and land stewardship. Funding both public and private projects to manage and restore wildlife populations and habitats, and support environmental education programs, was the major focus of the grant program identified in the 1995 EIS.

In its early years, approximately $100,000 was available for distribution in the CCS budget for the refuge. In its last 2 years of implementation, years 2000 and 2001, 22 projects were funded by the refuge each year, with an annual budget of approximately $89,000 and $75,000, respectively. Both years prioritized awarding projects on partner lands.

Unfortunately, after 2001, the refuge was never able to secure a stable, annual funding source and the available funding declined to zero dollars. In fact, due to budget issues, the Service put the entire CCS program on hold nationally in fiscal year 2011. Despite this setback, under all alternatives, refuge staff seek to retain the authority and administrative framework to implement a CCS or other Federal grant program should funding become available, and continue to maintain a Partners program, because of the immeasurable benefits of leveraging funding among partners to achieve all four refuge goals.

The Service's most recent guidance on CCS grants was developed by the Department in 2010 (DOI Guidance Release 2012-05). The Service's manual chapter 055 FW 6, prepared in 1992, has not been updated to reflect this new guidance, but we would remain compliant with all current guidance. An active grants program would support all refuge goals, as well as the legislated refuge purposes.

Urban Wildlife Refuge Partnerships

The Refuge System's Urban Wildlife Conservation Program, and the refuge's current contributions to that program (e.g. establishing Urban Wildlife Refuge Partnerships), are described in chapter 3. As noted in chapter 3, opportunities for urban partnerships are particularly relevant for Conte Refuge due to the refuge's proximity to several major cities and many urbanized areas, such as the Springfield, Massachusetts and Hartford, Connecticut metropolitan areas. These refuge partnerships aim to engage students and community members in environmental education and urban restoration projects to create a network of conserved habitats in the Connecticut River watershed.

Under all alternatives, we would continue to support our existing urban wildlife refuge programs in Springfield and Hartford, and pursue new ones. Implementation of the urban programs could also occur through existing refuge programs such as Adopt-a-Habitat, Conte Corners, WOW Express, YCC, SCA crews, and volunteers. Working with partners to protect important habitats and engage urban audiences in conservation contributes to all refuge goals.

Land Stewardship Outreach

Under all alternatives, we would continue to encourage landowners and conservation organizations within the watershed to consider all opportunities to benefit wildlife and aquatic habitats when they are evaluating management options. This outreach would take many forms, including personal landowner contacts, community forums, and supporting their efforts to secure funding for restoration projects and for habitat and farmland protection, such as easements. Further we would seek opportunities to support sustainable recreational and economic practices. By working collaboratively where refuge priorities are an important consideration, and by sharing the most current science, research, and management practices with landowners and partner organizations, we hope to sustain the excellent standards of stewardship that are the hallmark of the region's strong land ethic. This program would support goals 1, 2, and 4.

Land Conservation and Protection

An important partnership is focused on land conservation in the watershed. The decision document establishing the refuge (USFWS 1995) emphasized that the refuge was part of a larger conservation mosaic to protect and manage wildlife and fish habitat in the four-state watershed. We carry that emphasis forward in the present plan. All alternatives include our continued participation in those

partnerships with the goal to permanently protect and sustain Federal trust resources, and other unique natural resource values, in the Connecticut River watershed. An important component of this goal is an objective to improve connectivity between existing and future conservation tracts, while preserving working landscapes, and public access. The refuge's conservation partnerships in the region have evolved into a dynamic, landscape-level, multi-partner effort, led primarily by the Friends of Conte. As an association of organizations, the total list of engaged partners is long and includes the Service, other Federal agencies, State agencies, private conservation organizations, local communities, private landowners, and private businesses. A list of partnerships we are involved with is included as appendix N. Chapter 3 and the proposed LPP (appendix C) include descriptions of some of the important refuge acquisition accomplishments to date, as well as some current land conservation projects. In our discussion of CPAs and CFAs under the alternative B summary above, we discuss that our land acquisition focus for the refuge would be in CFAs. Elsewhere in CPAs and the greater watershed, we would work to actively support partner-driven land protection initiatives, with a priority to facilitate connections among conservation lands, especially those that would build biological continuity with the refuge and watershed.

Under all alternatives, when the Service acquires land from willing sellers in full, fee-simple ownership in the future, our intent is to allow public access for compatible public recreation and other compatible refuge uses, consistent with what we currently allow. When a conservation easement, or a partial interest, is purchased, the Service's objective is to obtain all rights determined necessary to ensure protection of Federal trust resources on that parcel. Typically, at a minimum, the purchase would include development rights. However, we may also seek to obtain the rights to manage and enhance habitats, and/or to manage public use and access, if the seller is willing and funding is available. Implementing a land conservation and protection program helps to achieve all refuge goals.

Agricultural and Forest Lands Protection

Under all alternatives, we support the protection of high-value and productive working farms and forests.. We will seek opportunities to facilitate and support the enrollment of these lands into voluntary landowner incentive programs, and once enrolled, consider those lands conserved. The refuge does not intend to target these lands for acquisition. Instead, our priority would be to work with individual landowners, organizations, states, and other Federal agencies to protect these lands and ensure they continue to be part of an integrated, working landscape. There are many state and Federal programs that focus on protecting working farms and forests and help promote economically viable practices that benefit wildlife and help protect water quality. Through our private lands program, we will help landowners who are interested in these programs connect with the proper state and Federal agencies and programs.

Occasionally, we may acquire agricultural lands (in fee-title) from willing sellers, when other agricultural programs are not available to keep the land in agricultural production. Unfortunately, in certain economic times the costs to farmers to sustain agricultural protection are prohibitive, and the value of the lands for development is very high. In these situations, we may purchase agricultural lands to prevent development and ensure wildlife habitat conservation.

Working with partners to protect agricultural land from development would help achieve goals 1, 3, and 4.

Rare and Exemplary Natural Communities

All of the alternatives would strive to protect, maintain, and restore rare and exemplary natural communities across the watershed, and particularly on refuge lands. Natural communities are an assemblage of plants and animals within a

particular physical environment that are affected by natural processes such as soils, hydrology, topography, and climate (Thompson et al. 2000, Sperduto et al. 2004, Sperduto 2005, Garland 2011). Species composition, vegetation structure, and environmental conditions are distinguishing characteristics used to classify natural community types (Thompson et al. 2000, Sperduto 2004). Natural Heritage Programs evaluate these communities and assign them a quality rank based on the ecological integrity of the community relative to other examples of that community type. Rare and exemplary ranked communities are a conservation concern due to their minimal presence on the landscape. A community may be considered rare due to natural influences (e.g., edge of range), or from human disturbances. Exemplary communities are high quality examples of more common community types, and tend to have a high biological diversity (Thompson et al 2000, Sperduto et al. 2004).

Exemplary and rare natural communities in the Connecticut River watershed, such as vernal pools, are vitally important to the health, integrity, and biodiversity of the watershed and contribute to our understanding of natural systems and their functions. Despite the small size, patchiness, and ephemeral nature of some of these habitats, their value is disproportionately significant. All alternatives recognize their importance and promote their conservation and restoration, where feasible.

Our objective is to conserve and maintain all rare and exemplary communities identified by respective State natural heritage programs to maintain the integrity, amount, and distribution of these community types across the watershed. On other ownerships, we would work with willing landowners to protect and restore these areas, and seek special designations as appropriate. Within 10 years of CCP completion, and in coordination with the respective States and other conservation partners, we would:

Northeastern bulrush

USFWS

- Assist partners in completing inventories and mapping for known rare or exemplary communities within the watershed.
- Assist partners with assessing habitat conditions in mapped areas and identify any threats to those conditions.
- Evaluate the potential occurrence of rare or exemplary communities on refuge lands before refuge activities are initiated, and if they are located, ensure best management practices are followed to protect them.
- Facilitate the development and use of a decision support tool to prioritize any needed restoration efforts for these community types on refuge lands and use active restoration (e.g., tree plantings, tree girdling, non-commercial thinning, and removal of invasive species), as warranted.
- Help monitor species' response to restoration and protection efforts.
- Cooperate with willing landowners to promote special designation areas for these natural community types, as warranted, to support their protection.

Implementing this program supports refuge goal 1 relating to wildlife and fish habitat conservation.

All of the alternatives would continue to utilize an adaptive management approach on refuge lands that allows flexibility in management to respond to new information and spatial and temporal changes and environmental events, whether foreseen or unforeseen, or any other factors that influence our decisions. Our goal is to be able to respond in a timely manner to any new information or events.

The need for flexible or adaptive management is compelling today because our present information on refuge species and habitats is incomplete, provisional, and subject to change as our knowledge base improves.

One example of how we will implement adaptive management is in response to the regional impacts of climate change. Our watershed-level partnerships with state agencies, numerous conservation organizations, private and other public landowners, coupled with our refuge expansion proposals, would result in more resilient habitats across the landscape, and help reduce other non-climate stressors. Conserving and connecting protected lands provides wildlife migration corridors, maintains refugia for species on the edge of their range, removes dispersal barriers and establishes dispersal bridges, protects hydrology, and increases the ecological, genetic, geographical, behavioral and morphological variation in species. As funding permits, our plans to control invasive plants, maintain the integrity and function of forest floodplains and wetlands, and promote forest health and diversity, could also minimize climate change impacts.

At the refuge level, monitoring and assessing management actions and outcomes within a scientifically rigorous framework, and tracking critical resources and indicators of forest ecosystem health, is a fundamental component of an adaptive management strategy. As appropriate, the refuge manager, in consultation with stakeholders, would be responsible for changing management actions and strategies on refuge lands if they do not produce the desired conditions. As we develop HMPs and a variety of other public access and operation plans that build off this CCP, any significant changes may warrant additional NEPA analysis and public comment. Minor changes will not, but we would document them in our project evaluation reports or annual reports. Implementing an adaptive management strategy will support all refuge goals (goals 1 through 4).

Research

Under all alternatives, research on Federal trust and other priority species and their habitats would continue to be an important aspect of refuge administration and also encouraged through partnerships on lands throughout the watershed. Generally, we would continue to approve special use permits for research on refuge lands that provide a direct benefit to the refuge by informing decisions on managing natural resources on the refuge and throughout the watershed. The refuge manager may also endorse and support study proposals throughout the watershed that contribute to the conservation or enhancement of native species and biological diversity, inform climate change predictions, or support ecoregional conservation information needs, such as those identified by the NALCC, Joint Ventures, species recovery plans, or Friends of Conte Stewardship Committee.

All researchers operating on refuge lands would continue to be required to submit detailed research proposals following the guidelines established by Service and refuge policy. Special use permits will also identify the schedules for progress reports, the criteria for determining a completion date, and the requirements for publication of interim and final reports. All publications will acknowledge the Service's role as a key partner and in funding and/or operations. Researchers would be required to take steps to ensure that invasive species and pathogens are not inadvertently introduced to the refuge or the greater watershed, nor transferred from one part of the watershed to another. We would continue to ask our refuge biologists, to peer review and comment on research proposals and draft publications, and will share research results internally, with these reviewers, and other conservation agencies and organizations. We may also ask other divisions of the Service, USGS, select universities or recognized experts, or representatives from the four states to help review project proposals and publications.

Some projects, such as banding studies, require additional Service permits. The refuge manager would not approve those projects until all required permits are

received and for those projects that may affect federally listed species, not until the consultation requirements under the ESA have been met.

An active research program would support refuge goals 1, 2, and 4.

Inventory and Monitoring Program

Establishing a baseline of refuge resource information from which to make management decisions is critical to achieving our goals. There is much we would like to know about the refuge's resources, including how they function or move across the landscape, and what, if anything, are threats. Unfortunately, there is not enough time or funding to compile all the information that we would like to know. There are several studies that we have conducted recently, or plan to initiate, as soon as funding is available. These include:

- Breeding songbird baseline inventories (Pondicherry Division collected data in 2004 to 2006, and 2009 to 2011, and Nulhegan Basin Division collected data from 2000 to 2007).
- Puritan tiger beetle monitoring and population management (initiated in 1997).
- Habitat inventories (which we completed at Nulhegan Basin and Pondicherry divisions) in all refuge divisions, including forest health assessments; to be completed when enough lands are acquired to warrant an inventory effort.
- Breeding woodcock surveys conducted at Nulhegan Basin Division since 2000.

Other top priority activities we have identified as funding allows include:

- In conjunction with development of an Inventory and Monitoring Plan (IMP), identify inventory methods, priorities, and schedules to evaluate the status of other priority species and habitats identified in this CCP.

Other projects may arise as we develop our refuge HMPs and work cooperatively with partners to identify conservation priorities across the watershed and as funding becomes available. We would adjust our priorities listed above in response, as warranted, and update our IMP accordingly. Implementing this program supports refuge goal 1 relating to the conservation of wildlife and fish habitats.

Integrated Pest and Invasive Species Control

The Refuge System has adopted an Integrated Pest Management approach to eradicate, control, or contain invasive species on refuges (517 DM 1 and 7 RM 14). This refuge has a long history of collaborative control both on- and off-refuge lands. Our objectives are to develop criteria that will help us identify priority species for control, react quickly to reduce the chance that new invasive species become established, or pose a threat to susceptible resources, and control the spread of what does exist.

In partnership with others, we will identify and respond to invasive plant and animal species that pose a threat to the native diversity of the watershed, particularly where refuge lands are threatened. Of particular concern on the refuge are Japanese stiltgrass, Japanese knotweed, purple loosestrife, pale swallowwort, water chestnut, mile a minute vine, didymo (also known as "rock snot"), zebra mussels, mute swans, etc. We will continue to train staff and partners to identify, watch for, and report those species deemed by state and regional experts as posing the highest threat and warranting "Early Detection/ Rapid Response" status. These species would be the highest priority to control, if found. Another priority would continue to be eradicating new or very small occurrences of any invasive species before they have a chance to establish in order to keep areas weed-free.

We would continue to focus on controlling, and preventing the establishment of, invasive plants species that are the greatest threat to priority resources. On refuge lands, to the extent possible, we will physically remove invasive species. Chemical control on refuge lands will be assessed on a case-by-case basis. Any chemicals determined by the refuge manager to be necessary will only be used following the mandated internal review and approval, as well as complying with all applicable regulations and laws.

G.A. Cooper @ USDA-NRCS PLANTS Database

Multiflora rose

In conjunction with the HMP and IMP, we will develop a list of invasive species of greatest concern on the refuge, identify priority areas with which to be vigilant, and establish monitoring and treatment strategies. We will also consult States and their respective lists of prohibited and targeted invasive species. We will reference the National Wildlife Refuge System Invasive Species Management Strategy released in May 2004 (USFWS 2004b) for additional tools, processes, and strategies. The 2004 report is complemented by a technical report issued in May 2005 by USGS, titled "The Invasive Species Survey: A Report on the Invasion of the National Wildlife Refuge System" (USGS 2005). Additionally, in 2011, researchers completed an inventory of invasive plant species on a few refuge divisions (Edvarchuk et al. 2012). This inventory also included recommended actions to help control and prevent the spread of invasive plants on the refuge. Based on these reports and refuge-specific information, we have developed the following strategies in support of goal 1:

- Continue to support efforts by Friends groups to hand-control invasive plants on refuge lands where feasible and effective.
- Institute proper care and cleaning of all refuge equipment to avoid introduction or transport of invasive plants; require researchers and contractors on the refuge to take steps to prevent transport of invasive plants and pathogens.
- Implement outreach and education programs, including signage, where appropriate, to enlist the help of refuge visitors and actively support state initiatives on this topic.
- Ensure all management activities minimize disturbance to soils where invasive plants occur that benefit from disturbance.
- Use clean mulch, gravels, and other materials for all refuge projects.
- Use native species for soil erosion control and restoration purposes. If native plants are not available or suitable, at a minimum, use species with no known invasive tendencies.
- Provide outreach to refuge users, including hunters, anglers, and paddlers and visiting public, to inform them of the risks they pose to accidentally introducing invasive species through their use of the refuge. For example, consider constructing boot brush stations at trailheads of trails that pass through high priority habitat to further prevent the introduction of new seed sources and raise awareness among visitors. Consider encouraging visitors to avoid heavily infested areas to prevent the spread of seeds.

We describe additional actions to combat invasive species that we propose to do in partnership with others under the goal 4 discussion below.

Refuge Staffing and Administration

Our proposals in this document do not constitute a commitment for staffing increases, funding for operations and maintenance, or future land acquisition.

Congress determines our annual budgets, which our Washington headquarters and regional offices distribute to the field stations. Chapter 3 presents our levels of staffing and operating and maintenance funds for the refuge in 2012. The activities shared among the alternatives we describe below pertain to staffing, administration, and operations.

Under all alternatives, we would continue to administer and staff the refuge as efficiently and effectively as possible. Staffing, and operations and maintenance funds, over the last 5 years are presented in chapter 3. Below we describe activities related to staffing and administration that are shared among the alternatives; some are new, others are on-going. Implementing these activities supports the four refuge goals.

Permanent Staffing and Operational Budgets
Under all alternatives, our objective is to sustain annual funding and staffing levels that allow us to achieve our refuge purposes and goals. Currently, the refuge maintains a permanent workforce of 9.5 full time equivalents. This core staff is supplemented by term appointments, and Pathways Program students, within the constraints of the refuge's discretionary operating budget.

In response to Refuge System operational funding declines nationwide, our region initiated a new base budget approach in Fiscal Year 2007. The goal is to have a maximum of 75 percent of a refuge station's budget cover salaries and benefits, while the remaining 25 percent or more will be operations dollars. The intent of this strategy is to improve the refuge manager's capability to do the highest priority work and not have the vast majority of a refuge's budget tied up in inflexible, fixed costs. This strategy was successful for a few fiscal years; however, we now anticipate a level or declining budget environment, which will impact flexibility in managing financial resources and may have implications for the level of permanent staffing. A new round of workforce planning began in 2013 in response to the sequester and anticipated future budget reductions.

In 2011 the refuge entered into a Memorandum of Understanding (MOU) with the four State directors of NRCS. Funding derived from NRCS under this agreement supported a refuge term biologist position. This position was funded by NRCS in FY 2012 and the refuge has since funded it out of declining discretionary operational funding. The role of this position varies by state, but the primary responsibility is to assist NRCS, in coordination with the state wildlife agencies, to implement conservation projects on the property of willing landowners seeking opportunities to bridge gaps in assistance to private landowners. Every effort would be made to avoid competing or duplicating the efforts of partners, especially other state and Federal agencies. Under alternatives B, C, and D, a private lands biologist would become a permanent, full-time position.

Appendix G lists our Refuge Operations Needs System (RONS) and Service Asset Management and Maintenance System (SAMMS). We include currently listed projects, staffing, and maintenance needs in those databases, and also indicate their proposed refuge ranking. The SAMMS projects are a list of backlogged maintenance needs that we report to Congress. We also included in appendix G any new projects not yet in the databases, but proposed under alternative C. Once the CCP is approved, if funding is not available through annual budget requests, we would continue to seek alternate means of accomplishing our projects; for example, through our volunteer program, Service regional grants, or other partnership grants, and internships.

Under all alternatives, and within the guidelines of the budget allocations, we would seek to fill positions approved in this CCP to accomplish our highest priority projects. Alternatives B and C propose additional staff to provide depth in our biological, visitor services, law enforcement, and maintenance programs.

We identify our recommended priority order for new staffing in the appendix G RONS tables. Appendix H portrays the staffing requests we propose under each alternative.

Providing adequate staffing to manage refuge programs supports all refuge goals.

Facility Maintenance
All alternatives include the periodic maintenance and renovation of existing facilities to ensure the safety and accessibility for staff and visitors. Our current facilities are described in chapter 3. They include administrative facilities such as refuge quarters at the Nulhegan Basin, Pondicherry, Blueberry Swamp, Salmon River, and Fort River divisions, the refuge office/visitor contact station at the Nulhegan Basin Division. Visitor facilities to be maintained under all alternatives include: the road network and hiking trails at Nulhegan Basin Division, the hiking trails at Pondicherry Division, trailhead parking areas at Nulhegan Basin and Pondicherry divisions, and information kiosks, signs, boardwalks, and viewing platforms on several divisions. The North Branch Trail at the Nulhegan Basin Division and the Mud Pond Trail at the Pondicherry Division will also require periodic maintenance. Any new facilities recommended in the final CCP, once constructed, will be placed on the maintenance schedule. All facilities and fleet maintenance and upgrades would incorporate ecologically beneficial technologies, tools, materials, and practices. Under all alternatives we would also continue to remove unnecessary buildings whenever feasible, such as buildings at the Fort River and Dead Branch divisions.


USFWS
Youth Conservation Corps

Maintaining facilities and buildings that are necessary for refuge management supports all refuge goals.

Energy Efficiency and Reducing our Carbon Footprint
The Service and Refuge System are working to increase the energy efficiency of our buildings and reduce our carbon emissions. Under all alternatives, we would continue to replace, as needed, our current fleet of vehicles and equipment with more fuel-efficient models (e.g., hybrid cars and trucks). All new facilities that we construct would incorporate green building technologies (e.g., the use of recycled materials). Trails and related structures will be designed to be easily maintained. We would also explore alternative energy sources and look for ways to upgrade current facilities to be more energy efficient and (e.g., installation of solar panels).

Youth Conservation Corps

Dependent upon annual funding, under all alternatives we would continue the YCC program. The YCC is a summer youth employment program that gives local youth the opportunity to work on refuge biological and visitor services programs. Typically YCC crews are comprised of four to six persons (15 to18 years old), and two crew leaders. In the past, the refuge has had YCC crews located at the Nulhegan Basin, Pondicherry, Blueberry Swamp, and Fort River divisions. This has been a popular program in the local communities because of limited youth employment opportunities, especially in rural areas. If enough funding can be secured, we would continue to offer this program and expand this program to support additional crews near other divisions as they become established. Supporting the YCC program helps achieve all refuge goals.

Volunteers

Volunteer opportunities would continue to exist under all alternatives. Volunteerism has long been a tradition within the Refuge System and has served a critical role on this refuge. The 1997 Refuge Improvement Act and the 2010 National Wildlife Refuge System Volunteer Improvement Act encourage and promote meaningful volunteer services. Assistance by volunteers is recognized as key to successful management of public lands and vital to implementation of refuge programs, plans, and projects, especially in times of declining budgets. Working with volunteers builds personal and community relationships, and promotes a shared stewardship of refuges and their associated natural and

cultural resources to be treasured and enjoyed by both present and future generations. Refuge staff will stay apprised of the Refuge System's development of a strategic plan for volunteers, Friends Organizations, and Community Partners.

Refuge staff would continue to cultivate existing volunteers and recruit prospective new volunteers so that more citizens may work successfully to help steward refuge lands and resources. Staff will endeavor to connect with a wider cross section of the American public to increase the diversity of volunteers. Further, staff will strive to provide adequate orientation to the Service and the refuge, a structured, interesting opportunity, enough contact and oversight to give volunteers adequate direction and support, and will ensure the work is recognized and appreciated. We will provide volunteers with an:

- Orientation to the Service, Refuge System, and refuge.
- Explanation of expectations, policies, and procedures that impact the planned work.
- Training in safety, first aid, and best management practices for relevant tasks.
- Training on various management techniques and best management practices for the tasks at hand.
- Written evaluations of and by volunteers to help facilitate recruitment and retention.
- Volunteer appreciation, incentives, and awards.
- On-refuge housing opportunities, as appropriate and when funding and space allow.

An active volunteer program supports all refuge goals.

Refuge Operating Hours

To protect refuge resources, under all alternatives we would continue to open most refuge units and divisions to the public 7 days a week from ½ hour before sunrise to ½ hour after sunrise, with the following exceptions:

- To protect sensitive resources, Wissatinnewag Unit (cultural resources) and Dead Man's Swamp Unit (federally threatened Puritan tiger beetle) are closed to all public use year-round.
- The Nulhegan Basin Division is open 24 hours a day.
- Areas may be seasonally or temporarily closed to protect refuge resources.
- Snowmobilers under a group permit on designated trails on the Pondicherry and Dead Branch divisions are allowed outside of these hours.
- Hunters, in accordance with respective State and refuge hunting regulations, may be allowed on the refuge outside of these hours.
- Visitors actively engaged in fishing, in accordance with respective State and refuge fishing regulations, may be allowed on the refuge outside of these hours.
- Other exceptions would be by special use permit, such as for research; night or overnight group wildlife observation, interpretive, and environmental educational programs; fishing, and, campers in designated camping sites.

Promoting access on refuge lands for appropriate and compatible uses supports all refuge goals, particularly goals 2 and 3.

Refuge Step-down Plans
Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. These plans would be developed regardless of the alternative selected for the final CCP. We have identified the plans below as the most relevant to this planning process, and we have prioritized them. They are listed in priority order for completion. We offer a more detailed explanation of some of them following our listing.

Step-down plans will be updated or revised as we gain new information or acquire new refuge lands so we can continue to keep them relevant. Existing plans will be updated consistent with the final CCP. All of these plans contribute to the mission of the Refuge System, the refuge's purposes, and one or more of the refuge's goals. Other than step-down plans that are strictly for administrative purposes, all other plans related to public use and access or habitat management, will involve NEPA compliance and a public process, including including partner, community, and stakeholder participation, review, and comment prior to a final decision and implementation. Examples include HMPs, Hunting and Fishing Plans, and Visitor Services Plans.

Within 3 years of CCP approval, we would initiate:
- HMPs for the following refuge divisions; priority order for completion includes HMPs for Nulhegan Basin, followed by Pondicherry, and Fort River divisions. Other HMPs will be completed as refuge divisions reach a sufficient size for habitat management activities (see discussion below).

- Hunt plans and opening packages for refuge lands in each State. We will follow all required administrative procedures to develop and approve hunt plans on refuge lands.

- Fishing plans and opening packages for refuge lands in each State. We will follow all required administrative procedures to develop and approve fishing plans on refuge lands.

- Annual Habitat Work Plans (AHWPs) would be developed by refuge divisions to support HMP implementation (see discussion below).

Within 5 years of CCP approval, we would initiate:
- IMPs for the following refuge divisions (see discussion below); the order of completion follows development of HMPs

- Fire management plans for refuge divisions; use of prescribed fire may also be included in HMPs, as warranted. If, upon development, it appears to be more efficient to consolidate fire plans by combining multiple divisions (e.g. by state), this will be pursued.

Within 7 years of CCP approval, we would complete:
- A Visitor Services Plan, combining all refuge divisions and units. This plan will incorporate hunt and fishing plans, which will be written for each State.

- A Law Enforcement Plan, combining all refuge divisions and units.

- Facilities and Sign Plan, combining all refuge divisions and units.

- Integrated Pest Management and Invasive Species Plan (see discussion below), combining all refuge divisions and units.

Habitat Management Plans
A HMP for refuge divisions of manageable size is the requisite first step to achieving the objectives of goal 1, regardless of the alternative selected for implementation. For example, the HMP will incorporate the selected alternative's habitat guidelines and strategies developed herein, and identify "what, where, how, and when" actions will be implemented over the 15 year timeframe to achieve those objectives. Specifically, the HMP will define management areas/ treatment units, identify type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. In this CCP, the goals, objectives, and list of guidelines and strategies under each objective identify how we intend to manage habitats on the refuge.

Both the CCP and HMP are based on public, stakeholder, and partner input; current resource information; published research; and our own field experiences. Our methods, timing, and techniques will be updated as new, applicable information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major vegetation changes (e.g., changes due to climate change) on at least a 5-year basis. As appropriate, actions listed below in "Actions Common to All Alternatives" will be incorporated into the HMP. When developing HMPs, refuge staff would follow all appropriate NEPA compliance requirements.

Annual Habitat Work Plans
The AHWPs for the refuge are priorities for completion upon CCP approval. Regardless of the alternative chosen, this plan is important and helpful when implementing habitat management actions and measuring our success in meeting the habitat objectives under goal 1. The AHWP is generated each year from the HMP, and will outline specific management activities to occur in that year. This document can also be used as an outreach tool to communicate our management plans and report our accomplishments for a given year.

Inventory and Monitoring Plans
IMPs will outline and prioritize the methodology to assess whether our original assumptions and proposed management actions are supporting our habitat and species objectives. For example, the IMP will help determine what types of inventories and surveys to conduct on refuge lands. Currently, we have some baseline information on our larger, more established refuge divisions (e.g., Nulhegan Basin and Pondicherry Divisions), but lack thorough baseline inventories on many of our smaller units and newer divisions. Also, as we acquire new refuge lands, our priority will be to conduct baseline vegetation and wildlife surveys and habitat mapping. All of these surveys will help us develop or refine an HMP.

Lupine restoration

USFWS

The IMP will also detail the types of long-term monitoring we plan to conduct on the refuge. During the development of our IMPs, we will coordinate our proposed projects with the work and priorities of the NALCC and with studies being conducted on other national wildlife refuges in the region. In particular, we will focus on monitoring NALCC representative species on the refuge. We will work with the NALCC and other partners (e.g., States, universities, and non-governmental organizations) to develop, prioritize, and implement inventories and monitoring that will help inform our management decisions on the refuge.

The IMP will also include efforts to assess the effects of climate change on refuge resources. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions. See more discussion on our inventory and monitoring program below.

Visitor Services Plans
The Service's policy on wildlife-dependent recreation (605 FW 1) directs refuges to develop visitor services plans to provide overarching guidance for the refuge's visitor services programs and facilities. The visitor services plan builds off the visitor services goals and objectives from the refuge's CCP and describes specific strategies for achieving these goals and objectives. The plan includes detailed information on the refuge's recreational program, including compatibility determinations and findings of appropriateness for refuge uses, and incorporates any hunting or fishing plans. When developing these plans, refuge staff would follow all appropriate NEPA requirements.

Environmental Education, Interpretation, and Outreach

Under all alternatives, we would continue working with our partners to enhance opportunities for quality environmental education, interpretation, and outreach. The refuge's mobile exhibit, the WoW Express, travels throughout the watershed to public events such as fairs and conservation-themed festivals. This exhibit also serves as a teaching tool for schools by contributing to specific state curriculum standards. In the near future, the refuge will unveil a Biological Assessment Trailer (BAT), a traveling environmental classroom that will bring tools and knowledge of conservation inventory, monitoring, and restoration to schools, providing them experiential learning focused on nearby habitats.. The ultimate goal is to use this tool to have schools, civic groups, local conservation organizations, and individuals form long-term connections to local natural areas and the refuge through an Adopt-a-Habitat program.

Under all alternatives, we would continue to develop curriculum, and adapt and implement programs in partnership with other educators using these teaching tools. We would also continue to offer on site programs at schools and other environmental educational facilities as resources allow. Our hope is that we can inspire a new generation of conservationists to embody a conservation ethic and form long-term relationships with the natural world through these connections. These programs would help achieve goals 2 and 4.

Hunting and Fishing

Under all alternatives we would continue to work with the respective States and our other conservation partners to provide quality opportunities for hunting and fishing throughout the watershed, and particularly on refuge lands where it is found to be compatible. Under the 1997 Refuge Improvement Act and Service policies (605 FW 2, 605 FW 3), hunting and fishing are two of the six priority public uses of the Refuge System (*http://www.fws.gov/refuges/hunting/*; accessed August 2016). The other four priority uses are wildlife observation, photography, environmental education, and interpretation. Additionally, with regards to hunting, Executive Order 13443 — Facilitation of Hunting Heritage and Wildlife Conservation, directs the Service "to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat."

All refuge lands currently open to hunting and fishing will remain open. With few exceptions, refuge lands are open consistent with State regulations. These regulations and limits are set annually using data about wildlife populations to ensure that species are not overharvested. Habitat that normally supports healthy wildlife populations produces harvestable surpluses that are a renewable resource. State agencies also set safety regulations to reduce any safety concerns

(e.g., requiring hunters and recreationalists to wear hunter orange during the hunting season, and requiring safety zones around buildings).

In general, as new lands are acquired for the refuge, our intent is to officially open them to hunting and fishing under state regulations wherever they are determined to be compatible. We will complete our administrative requirements to formally open lands to these uses, which includes a NEPA compliant process. On newly acquired lands that were previously open to public hunting and fishing, we will allow these uses to continue on an interim basis, wherever possible and compatible, until the administrative process, associated with hunting and fishing step-down plans, is complete. Those step-down plans will provide details on how the programs will be managed.

Hunting and fishing programs would help achieve goal 3.

Encouraging the use of nontoxic ammunition and tackle
Under all alternatives, we would continue to work with the States and our partners to educate and inform hunters and anglers on the impacts associated with the use of lead ammunition and tackle. For example, we would continue to distribute materials providing hunters and anglers with information on those impacts on fish and wildlife; encourage visitors to use cost-effective, lead-free ammunition and tackle; and, describe actions that can be taken to protect wildlife from contamination when lead ammunition and tackle are used. In addition, we will work with the States to identify the impacts associated with requiring the use of non-toxic ammunition and some fishing tackle for hunting and fishing on refuge lands. This would include identifying, quantifying, and evaluating the impacts of lead exposure to wildlife on refuge lands, as well as considering the impacts of lead restrictions on hunters and anglers. Prior to any proposed actions or changes to the status quo there would be opportunities for public input and comment, consistent with NEPA and specific to the refuge opening package and the other Service administrative and legislated requirements.

Our interest is in minimizing the impacts to fish, wildlife, habitats, and human health. Lead from tackle (e.g., lead fishing sinkers, weights, jigs, and other tackle) and lead shot (e.g., spend lead shot, bullets) can be poisonous to fish and wildlife if ingested (Michael 2006). Lead poisoning can cause severe negative effects on the nervous and reproductive systems of fish and wildlife and is often fatal (USGS 2013). Symptoms of lead poisoning often include weakness and lethargy, weight loss, and the inability to fly in birds (USGS 2013).

The main way in which wildlife is exposed to lead is by ingesting lead-contaminated soil and prey (Kendall et al. 1996, Pattee and Pain 2003, MA EOEEA 2014). Due to their feeding habits, waterfowl and other waterbirds are particularly susceptible to lead poisoning (Michael 2006). Some species of wildlife, such as waterfowl, can accidently swallow lead shot and tackle while feeding (MA EOEEA 2014, USGS 2013). Up to 50 percent of adult loons are killed by ingesting lost fishing sinkers and jigs (VDFW 2014). Also, laboratory studies show that an amount of lead as small as 82.5 milligrams can be lethal for a bald eagle (Pattee et al. 1981, Hoffman et al. 1981); this lethal amount represents less than one percent of a single 12-gauge slug, a single 20-gauge slug, or a single muzzleloader bullet. There are also concerns about impacts to human health from lead ammunition. Several studies have shown that fragments from lead bullets were present in wild game meat processed from human consumption, even though measures were taken to try to remove lead during processing (NPS 2014).

Lead-free ammunition is already required by Federal regulations and the four States in the watershed for hunting ducks, geese, swans, other waterfowl, and

certain other migratory birds, such as coots (50 CFR 20.21; 50 CRF 20.108). However, lead-free ammunition is not currently required for deer, turkey, or small-game hunting by any of the States or by refuge-specific regulations. Three of the four watershed States currently restrict the use of lead fishing tackle. Massachusetts does not allow the use of any lead sinkers, jigs, or weights that weighs less than 1 ounce. New Hampshire prohibits the use of lead sinkers weighing 1 ounce or less and lead jigs less than 1 inch long along their longest axis. In Vermont, it is illegal to sell or use lead sinkers weighing one-half ounce or less. Connecticut does not prohibit lead tackle.

Hunting and fishing programs support goal 3.

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for appropriateness and compatibility determinations. Appendix D includes proposed appropriateness findings and compatibility determinations to support the activities under alternative C, the Service-preferred alternative. Our CCP will include the final approved compatibility determinations for the management alternative selected. We would continue to only allow activities determined to be appropriate and compatible uses, and which meet or facilitate refuge legislated purposes, goals, and objectives, and contribute to the fulfillment of the Refuge System mission.

The refuge manager has determined that all six priority public uses can be accommodated in a manner compatible with refuge purposes on most portions of the refuge, although some uses allowed require stipulations to ensure compatibility. Stipulations are included in appendix D for each use the refuge manager proposes to be compatible. Appendix D also identifies some areas that are also closed to protect sensitive resources, while identifying others open only by special use permit. Non-priority public uses that the refuge manager proposes to be compatible on some or all of the refuge lands, and including stipulations, are also detailed in appendix C.

Managing compatible public uses supports refuge goals 2 and 3 related to education, interpretation, and recreation.

Activities Not Allowed

The 1997 Refuge Improvement Act states that "compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." Compatible hunting, fishing, wildlife observation and wildlife photography, and environmental education and interpretation are the priority general wildlife-dependent uses of the Refuge System. According to the Service Manual 605 FW 1, these uses should receive preferential consideration in refuge planning and management before the refuge manager analyzes other recreational opportunities for appropriateness and compatibility.

We have received requests for non-priority, non-wildlife dependent activities that have never been allowed on this refuge. Activities evaluated by the refuge manager and determined not to be appropriate on refuge lands include: ATV, off road vehicle, and dirtbike use, target shooting, manned and unmanned aircraft for recreational use, and off-road bicycling. Appendix C documents the refuge manager's decision on their appropriateness. Most of these activities are sufficiently provided elsewhere nearby on other ownerships; therefore, the lack of access on the refuge does not eliminate the opportunity in proximity to refuge lands. Furthermore, many of these activities are not consistent with public safety when combined with existing appropriate and compatible uses, or they harm wildlife and habitats, further supporting the finding of not appropriate. According to Service policy 603 FW 1, if the refuge manager determines a use is not appropriate, it can be denied without determining compatibility.

Not allowing inappropriate or noncompatible uses supports all refuge goals.

Permitting Special Uses

All of the alternatives would require the refuge manager to evaluate whether refuge uses that require a special use permit need to be evaluated for appropriateness and compatibility on a case-by-case basis. Activities that require special use permits include, but are not limited to, research, commercial or economic uses (e.g., commercial guiding, haying, commercial forest management), and furbearer management, hunting dog training, and camp leases at the Nulhegan Basin Division (see discussion below on "Cabin Leases at Nulhegan Basin Division"). Access outside of normal refuge hours also requires a special use permit (except at the Nulhegan Basin Division and for hunters and anglers at other divisions and units who are engaging in these activities in accordance with respective State and refuge hunting and fishing regulations). Implementing this program supports refuge goals 1, 3, and 4.

Commercial and Economic Uses

All commercial and economic uses would continue to adhere to 50 CFR, Subpart A, §29.1 and Service policy which stipulates that we may only authorize these types of public or private uses where we determine that the use contributes to the achievement of refuge purposes or the Refuge System mission. Examples of these types of uses include commercial haying and forest management to improve wildlife habitat. Allowing these activities also requires the Service to determine appropriateness and prepare a compatibility determination and an annual special use permit that outlines terms, conditions, fees, and any other stipulations to ensure compatibility. These uses, if implemented according to Service policy, could potentially support refuge goals 1, 2, and 3.

Removing Unnecessary Structures and Site Restoration

In order to reclaim habitat values, all alternatives include restoring to desired habitat conditions, as soon as practicable, developed sites that are no longer needed for refuge administration, public access, or visitor programs. Strategies for doing so include:

- Continue to remove dwellings, such as cabins, houses, out-buildings, or other developed sites or structures, following Service acquisition, as soon as practicable, if determined to be surplus to refuge needs. Re-grade sites to natural topography and hydrology and re-vegetate to establish desirable conditions, if necessary.

- Within 5 years of CCP approval, inventory and assess existing roads, buildings, and other infrastructure within the refuge. Continue inventory and assessments on new lands as they are acquired. Implement procedures to remove unnecessary infrastructure and rehabilitate sites to desired conditions.

These actions would help achieve goal 1.

Cabin Leases at Nulhegan Basin Division

Under all alternatives, there are no modifications proposed for the existing cabin leases under special use permit at the Nulhegan Basin Division. The Service acquired much of the division in 1999. At that time there were over 60 cabins on the property. Over the past 15 years, the Service has acquired 38 cabins of which 27 have been removed and 8 are still occupied by the original leaseholders as part of a term use agreement. This approach allowed the owner to extract much of their equity and still retain use of the cabin for a set period of time. These permits are renewed every 5 years, assuming the terms of the permit are met, for the life of the current lessees up to a 50-year maximum (i.e., 2049). Among others terms, permit conditions would continue to specify: (1) the camps must be maintained in a manner compatible with the purposes of the refuge and produce the least amount of environmental disturbance; and, (2) no permits will be issued for construction of new camps. Many of these structures were built as hunting cabins and may be used year-round, although not occupied as primary residences. We are not proposing any changes to the special use permit within the context of

this CCP. Appendix D includes a compatibility determination for cabin leases.

Mark Maghini/USFWS

Nulhegan Basin Division camp

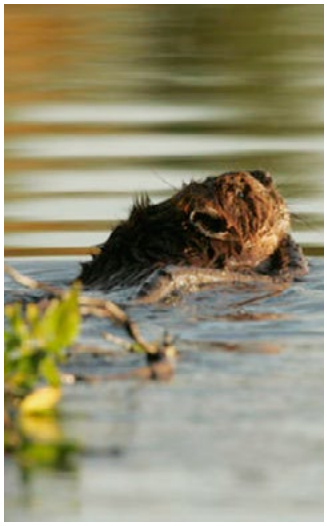
Boating Access

Under all alternatives, we would maintain existing boat launches at Nulhegan Basin and Pondicherry Divisions. Appendix D details how those uses would be managed consistent with our fishing program. Managing boat access on refuge lands supports goal 3 related to recreation.

Furbearer Management

Under all alternatives, we would continue to manage furbearer populations in a way that ensures we meet our refuge goals and objectives. There are times when individual furbearing animals, or local concentrations of those animals, affect our ability to achieve priority resource objectives. Protecting human health and safety, maintaining roads, trails, houses and other infrastructure, as well as concerns with impacts on other native wildlife and habitats, are a few of the reasons furbearers might need to be managed. The species most likely to cause concerns are beaver and muskrat. Both non-lethal and/or lethal techniques could be employed in any given situation. We would analyze each situation where these techniques would be employed, and choose the most appropriate method to achieve our objectives.

Beaver



Steve Hillebrand

The Service considers regulated trapping as an effective furbearer population management tool on national wildlife refuges (*http://www.fws.gov/refuges/hunting/whyAllowed.html*; accessed August 2016). Trapping by refuge staff, a Federal or State agency partner, or a State-licensed trapper working as an agent for the refuge, can occur at any time at the discretion of the refuge manager and is not subject to compatibility.

The alternatives differ in their provisions for a public regulated trapping program. Under alternatives A, B, and C, we would continue to have a public trapping program at Nulhegan Basin Division, based on refuge and State regulations, and as described in appendix D. Under these three alternatives, on lands we acquire in the future, we propose to allow trapping to continue as a tool to manage wildlife populations where it is presently occurring, and where the management need is supported by the respective State fish and wildlife agency. Prior to opening refuge lands to trapping, we would complete a NEPA compliant document, a compatibility determination, and a furbearer management plan.

In contrast, alternative D would only allow trapping as an administrative activity to address a management concern. Administering a furbearer management program supports refuge goal 1.

Fire Management

Under each alternative, prescribed fire could be used as a habitat management tool under specific criteria within the 15-year life of this CCP. While the chance of natural ignition is low, should a wildland fire occur, all alternatives also propose rapid and aggressive suppression in areas where property is likely to be threatened according to the guidance in appendix L, "Fire Management Program Guidance." Our suppression objective is to minimize human health or safety concerns, avoid property damage, and reduce the likelihood of resource damage. Fire is not a frequent natural ecosystem process in the Northern Forest. It has been suggested by researchers that stand-replacement fire occurs at 800-year or greater intervals in most regional forest types (Lorimer 1977). However, given Northeast Regional climate change predictions, the average temperatures may increase, especially in the summer. Coupled with little change in summer

rainfall, this may result in more frequent, short-term droughts (NECIA 2007). This, in turn, could alter the fire regime. We would continue to use an adaptive management approach and monitor changing conditions. If necessary, we could conduct prescribed burns to minimize the threat of a catastrophic fire event. Administering a fire program supports refuge goals 1, 2, and 4.

Expanding the Pondicherry Wildlife Refuge National Natural Landmark

The NNL program, administered by the National Park Service, recognizes and encourages the conservation of sites that contain outstanding biological and geological resources, regardless of landownership type (*http://www.nature.nps.gov/nnl;* accessed August 2016). Sites are selected for their outstanding condition, illustrative value, rarity, diversity, and value to science and education. They are designated by the Secretary of the Interior, with landowner concurrence, and the program is entirely voluntary. To date, nearly 600 landmarks have received the NNL designation within the United States, American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands.

In Chapter 3, "Affected Environment," we describe the establishment of the Pondicherry Wildlife Refuge NNL in 1972. That NNL designation includes 304 acres of what is now the refuge's Pondicherry Division. Specifically, Cherry and Little Cherry Ponds and the land immediately surrounding them were included in the designation (map 4.2). This was the rationale for designating this area as a NNL: "Within Pondicherry Wildlife Refuge are two shallow, warm water ponds, surrounded by marsh, bog, and forest that support an abundance of submerged, floating, and emergent vegetation, and a great variety of birds. The wetland complex is the type locality for a species of pondweed and spike-rush."

The Pondicherry Division was established in 2000 and, through time, has grown to over 6,405 acres. Now included in the division are several areas adjacent to or in close proximity to the original NNL that contain several examples of relatively undisturbed boreal forest communities including:

- Black spruce–larch swamp.
- Black spruce–tamarack forest.
- Lowland spruce–balsam fir forest.
- Northern hardwood seepage swamp.
- Dwarf shrub fen.
- Alder shrubland.
- Open basin cattail marsh.
- Winterberry/cinnamon fern/spruce tall shrub thicket.
- Yellow pond lily-pickerelweed-pondweed aquatic bed.
- Aerenchymatous deep emergent marsh.
- Leatherleaf-sheep laurel/black spruce dwarf heath shrub bog/very poor fen.
- Black spruce-larch/heath sphagnum swamp.

These exemplary boreal communities support a diverse array of species including spruce grouse, boreal chickadees, black-backed woodpeckers, white cedar, and numerous other plants and animals that depend on this complex of habitats.

In cooperation with the NPS, all alternatives would expand the boundary of the Pondicherry NNL to one that includes the relatively undisturbed wetlands and boreal forests of the John's River and Mud Pond (map 4.2). We had initiated the administrative process for this expansion, but never completed it. The new, proposed boundary would encompass a total of 998 acres, and including the original 304 acres.

Within 5 years of CCP approval, we will complete all administrative procedures necessary for NPS to consider expanding the existing NNL boundary and convene a workshop with ecologists to determine what additional information should be collected and what monitoring should occur to document any potential loss or degradation of the area. We will also establish a baseline from which to

conduct monitoring and the collection of subsequent information. Implementing this program supports refuge goal 1 relating to the conservation of open water and wetlands habitats.

Cultural Resource Protection

As a Federal land management agency, the Service is entrusted with the responsibility to locate and protect all historic resources, specifically archeological sites and historic structures eligible for, or listed in, the National Register of Historic Places. This applies not only to refuge lands, but also on lands affected by refuge activities, and includes any museum properties. As described in chapter 3, archeological remains in the form of prehistoric camps or villages would most likely be located along streams and lakes where early inhabitants would have ample water, shelter, and good fishing and hunting opportunities. Under all alternatives, we would continue to conduct an evaluation on the potential to impact archeological and historical resources as required, before taking any ground disturbing action, and would consult with respective Tribal and State Historic Preservation Officers (THPOs and SHPOs). We would be especially thorough in areas along lakes, the confluence of streams, river corridors, and other areas where there is a higher probability of locating a site. These activities would ensure we comply with section 106 of the NHPA, regardless of the alternative. Compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey. Protecting cultural resources would support refuge goals 1, 2, and 4.

Endangered Species Act Section 7 Consultations

Under all alternatives, all projects would continue to comply with the ESA. Approved consultation processes would continue to be followed for projects potentially affecting listed species or designated critical habitat on a site-specific basis as project implementation occurs. Protecting federally listed species supports goals 1 and 4.

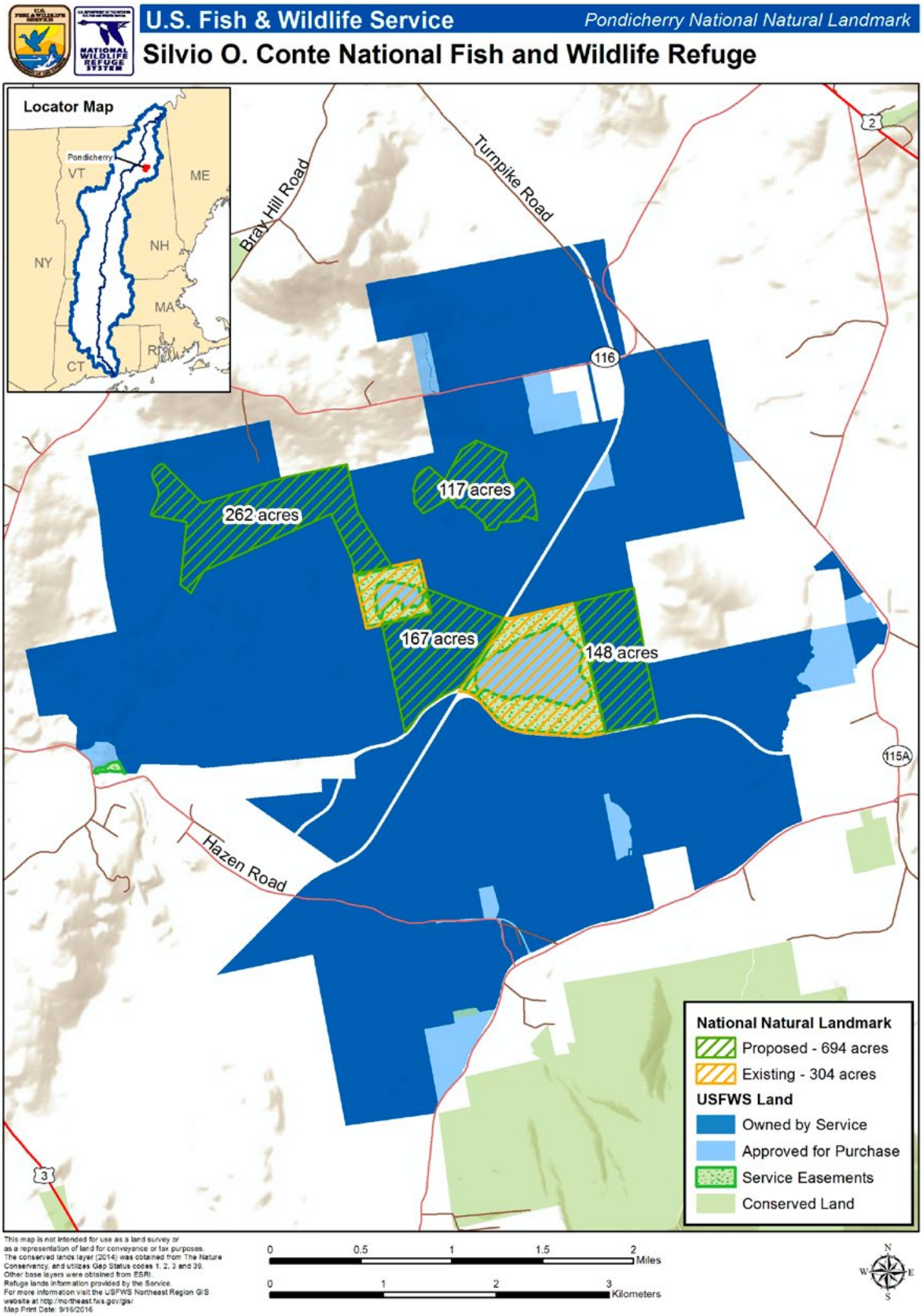
Wilderness Review

As we described in chapter 2, Refuge System planning policy requires that we conduct a wilderness review during the CCP process. The first step is to inventory all refuge lands and waters in Service fee ownership. Our inventory of this refuge determined that two areas at the Nulhegan Basin Division meet the eligibility criteria for a Wilderness Study Area (WSA) as defined by the Wilderness Act. Out of the wilderness study, four alternatives were developed for the two study areas. Under the Service's preferred alternative, neither of the WSAs would be proposed for new wilderness designation. Because the forest habitat has been heavily managed, it was concluded that a combination of active and passive management would be the best path to restore multi-aged forests, comprised of native species growing on appropriate natural community sites. In the absence of active management, restoration of desired natural community composition and structure would be unacceptably protracted. The results of the wilderness inventory and study are included in appendix E. The entire refuge would undergo another wilderness review as part of the next CCP planning process. Specifically, any lands acquired in fee by the Service in the interim, along with existing refuge lands, would become part of that wilderness review.

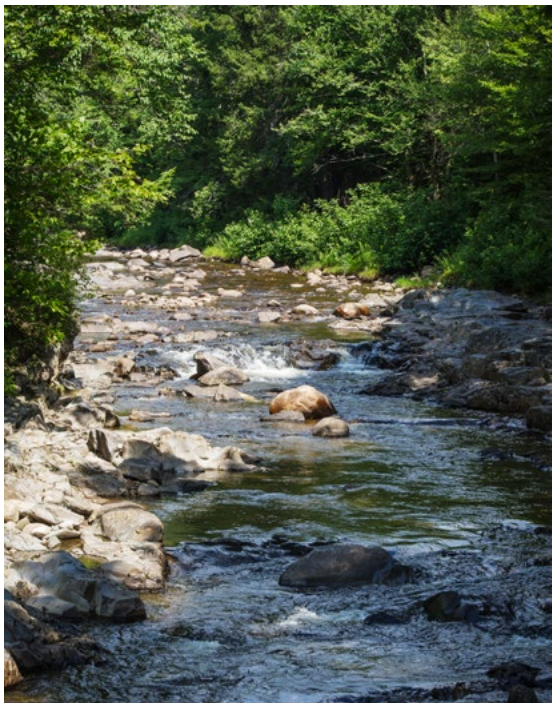
Wild and Scenic Rivers Review

Service planning policy also requires that we conduct a wild and scenic rivers review during the CCP process to determine their potential for Federal Wild and Scenic Rivers designation. We inventoried the river and river segments which occur within CPAs and determined that some river segments met the criteria for wild and scenic river eligibility. These river segments and their immediate environments were determined to be free-flowing and possess at least one Outstandingly Remarkable Value. However, we are not pursuing further study to determine their suitability, or making a recommendation on these river segments at this time, because we believe the entire river lengths should be studied (not just those on refuge lands) with full participation and involvement of our Federal, state, local, and nongovernmental partners and other stakeholders. The results of our Wild and Scenic River inventory are included in appendix F.

Map 4.2. Pondicherry National Natural Landmark, Including the Current and Proposed Expanded Boundary



In appendix F, we recognize our information may not be complete or current. Some of the river segments in the watershed are currently being evaluated by other entities for their potential to be designated. We learned of several studies underway or where there is interest in initiating a planning process; however, we do not provide status updates in this document because we simply did not have the resources to check out every potential project. However, for those planning efforts or studies underway in any of the CPAs, we request lead agencies or organizations to contact us so that we may partner in those efforts.



Sharon Lindsay

Black Branch of the Nulhegan River

All alternatives would provide protection for free-flowing river values, and other river values, pending the completion of future comprehensive inter-jurisdictional eligibility studies.

Distributing Refuge Revenue Sharing Payments

As we describe in chapter 3, we pay the associated localities annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands within their jurisdiction. These annual payments are calculated by a formula determined by, and with funds appropriated by, Congress. All of the alternatives would continue those payments in accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress. Additional towns would be added to the program with future acquisitions. Implementing the refuge revenue sharing payment program helps achieve goal 4.

Silvio O. Conte Refuge Advisory Council

All alternatives include our recommendation to officially disband the Silvio O. Conte NFWR Advisory Committee. The Conte Refuge Act (Section 108) called for the creation of this Advisory Committee to assist the Secretary on community outreach and education programs that further the purposes of the refuge. The Committee, which has never been fully constituted, was to be comprised of members from each of the four States, with members representing the refuge's municipal, state agency, and private conservation organization partners. Efforts were made to establish and maintain this formal, multi-agency, 15-member committee but, ultimately, these Secretarial and Gubernatorial appointments proved unsuccessful due to the short-term limits and the length of time it took to designate an appointee. Since the creation of Conte Refuge in 1991, we have accomplished the intent of the Advisory Committee through other means. The refuge's strong commitment to community outreach and environmental education has been, and would continue to be advanced through partnerships with the organizations that comprise the Friends of Conte Refuge, the Connecticut River Watershed Council, environmental educators in the four watershed states, and the operations of the refuge's visitor facilities.

Actions Common to Alternatives B, C, and D Only

The three action alternatives differ from alternative A in four important ways which we describe below.

(1) **Enhancing public access for compatible recreational uses on refuge lands.** The three action alternatives would allow permanent public recreational access across a proposed expanded Federal land base for priority public uses and other compatible recreational uses to the extent possible and consistent with refuge goals and objectives. The level of infrastructure to provide these opportunities differs among the alternatives, but they have in common the premise that refuge lands should be open to compatible public uses. The proposed refuge expansion also varies among the alternatives.

(2) **Implementing Strategic Habitat Conservation.** The three action alternatives incorporate the concept of SHC which is a planning framework that includes steps for planning, design, delivery, and monitoring (Figure 2.2). Each step integrates the best available ecological, biological, and climate science — from the Service's geographically based LCCs, partner research, university programs, and other sources — in an ongoing and iterative cycle of planning, implementation, and evaluation (*https://lccnetwork.org/*; accessed August 2016).

LCCs are applied conservation science partnerships with two main functions. The first is to provide the science and technical expertise needed to support conservation planning at landscape scales–beyond the reach or resources of any one organization. Their second function is to promote collaboration among their members in defining shared conservation goals.

Conte Refuge lies within the NALCC which pioneered the application of the concept of selecting surrogate species (or referred to in North Atlantic LCC publications as "representative species") for general habitat types. A representative species is a species whose habitat needs, ecosystem function, or management responses are similar to a group of other species. It is assumed that conservation planning, design, and actions for a representative species will also address the needs of other species and effectively sustain fish and wildlife populations at desired levels in the face of land use change, climate change, and other stressors occurring within the NALCC. The NALCC facilitated completion of the *Connect the Connecticut* Landscape Conservation Design (LCD) in the watershed which informed development of this CCP.

This LCD project is a collaborative effort among 30 partners, including the Service, to develop and implement a strategic plan for the watershed that will sustain habitat for fish, wildlife, and plants within a working landscape, while also reliably providing clean water, storm protection, recreation and many other natural benefits that support people and communities. It is intended to guide collective conservation actions within the watershed and connect to broader regional conservation goals for conserving sustainable fish and wildlife populations and their habitat for people within a working landscape. Science-based tools were developed that will serve to facilitate a conservation design for other geographies in the entire Northeast Region (*http://connecttheconnecticut.org/*; accessed October 2016).

Under alternatives B, C, and D, we would use the design and products that have been generated by the *Connect the Connecticut* LCD and any additional relevant resources of the NALCC and our partners in developing step-down plans.

Using the proposed CPA and CFA land conservation design to prioritize resource commitments. All three action alternatives would fully support and benefit from the land protection programs of other Federal and State agencies, and other partners. Alternatives C and D also seek to increase the

refuge's current approved acquisition authority. All three alternatives would concentrate Service partnership activities within CPAs and Service land acquisition activities primarily in CFAs. Under our summary of alternative B, we provide more detailed definitions of CPAs and CFAs. The delineation of CPAs and CFAs incorporates priority areas for conservation, namely core areas and connectors, recommended in the *Connect the Connecticut* LCD.

While the number of CFAs differ among the alternatives, and the size of individual CFAs may vary among alternatives, the process and criteria used to define them was similar. They were identified by refuge staff, State partners, and conservation organizations as important for conserving Federal trust resources, NALCC and State WAP priority species, addressing climate and other land use changes, and contributing strategic connections among the network of permanent conserved lands in the watershed.

Under each of the three action alternatives, the Service would consider land exchanges with State agencies and conservation organizations of some of the smaller, disjunct refuge parcels or units that were acquired under the 1995 FEIS authority. Such exchanges would be considered on a case-by-case basis, based on whether the exchange creates efficiencies in refuge management and cost, and the protection of resources could be ensured with the new owner. Also, all lands exchanged to the Service would have to be of equal or greater monetary and resource value than that which the Service is exchanging.

The remainder of this chapter describes objectives we have developed at the watershed scale that are common to alternatives B, C, and D. These watershed-level objectives indicate a desired future condition, and/or course of action, that we are recommending as we work cooperatively and collectively with our partners within CPAs to achieve conservation goals. In other words, at the watershed scale, we are presenting one set of goals and objectives to implement regardless of the action alternative, to achieve the four broad conservation, environmental education, recreation, and partnership goals we described in chapter 1. We provide a rationale for each objective to show why we think each one is important. It is also important to highlight that our implementation focus for these objectives would be within CPAs, across multiple ownerships, and only in partnership with willing landowners and our conservation partners.

The primary distinction among action alternatives B, C, and D is the management direction (e.g., primarily strategies) we propose to implement on existing and proposed refuge lands, including within proposed CFAs. Table 4.8 at the end of the chapter, presents many of the differences among the alternatives in the form of strategies that would apply to existing and proposed refuge lands. The listing of strategies and associated actions by alternative in table 4.8 assumes each respective alternative's full implementation, including the staffing, funding, and infrastructure needed to support those strategies and actions.

In addition, final CCP/EIS appendix A provides more specific details on implementing alternative C, the Service-preferred alternative. In appendix A, we present subobjectives, strategies, and a rationale for managing each refuge division, unit, or proposed CFA (which would ultimately become a refuge division). We indicate how the subobjectives and strategies presented in appendix A tier to the watershed-wide goals and objectives below, but we also provide further details on specific actions we would undertake to implement the subobjectives and strategies on existing and proposed refuge lands. None of the information in appendix A is intended to direct or prioritize management on other ownerships.

Watershed-wide Objectives

WILDLIFE AND HABITAT CONSERVATION

GOAL 1

Wildlife and Habitat Conservation. Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1 Forested Uplands and Wetlands (Including Riparian and Floodplain Forests)

In cooperation with willing landowners and other partners, protect, manage, and restore forested habitats within the Connecticut River watershed. These forested habitats will help sustain the biological diversity, integrity, and ecological and hydrologic function of the river ecosystem, provide habitat connections and wildlife travel corridors, accommodate anticipated shifts in species' ranges from climate and land use changes and support forest-dependent species of conservation concern, including migratory birds and federally listed endangered and threatened species.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate the protection, management, and restoration of forested uplands and wetlands throughout the watershed, with priority attention to CPAs, include the following:

- **Core Forest Blocks**: Work with partners and willing landowners within the watershed to facilitate the protection and restoration of unfragmented, contiguous blocks of forest to benefit native interior forest wildlife and to sustain natural ecological processes and functions. To protect area-sensitive forest-interior species, these forest blocks should be a minimum of 500 acres in size and within a mile of other large forest blocks.

Rationale: Scientists consider habitat fragmentation to be one of the great threats to wildlife survival worldwide. We define habitat fragmentation as a process during which "a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original (Wilcove et al. 1986)." This transformation has the ability to:

- Reduce the amount of habitat.
- Increase the number of disparate habitat patches.
- Decrease the size of intact habitat patches.
- Increase the isolation of these patches.

We differentiate habitat fragmentation from habitat loss, such as that which results from converting forest land to agricultural and urban uses. Habitat loss (or permanent fragmentation) refers to long-term conversion of forest to urban, residential, agricultural (e.g., forest production, row crops, pasture, hay, etc.), or other non-forest uses. Roads, trails, and utility corridors can also create permanent fragmentation. This permanent loss of contiguous forest habitat alters ecological processes and has a negative impact on biodiversity.

One ecological principle, the species-area relationship, has led to an emphasis on contiguous habitat conditions (MacArthur and Wilson 1963). Large forest blocks support more species than small areas because they support larger population sizes of individual species, which reduces the chances of stochastic extinction, promotes genetic diversity within populations, and buffers populations against disturbances. And, forest edges need to be minimized because the effects of habitat alteration extend for some distance beyond the areas directly altered. For instance, studies have documented edge-related habitat changes including: increases in invasive species introductions (Lake and Leishman 2004),

altered predator-prey dynamics (Brittingham and Temple 1983, Wilcove et al. 1986, Donovan et al. 1997), and declines in forest biodiversity (Fahrig 2003). The dispersal of plants and wildlife species can be affected if species or their propagules (e.g., seed and spores) cannot cross a disturbed area, find suitable habitat within it, or successfully compete with disturbance adapted species. The simple way to maintain a population of a particular species is to guarantee the existence of a sufficient area of suitable habitat that can be kept free of alien competitors, predators, and diseases. In practice, the design of such habitat areas must take into account the ecological requirements of the species and the minimum size of a population that can sustain itself in the face of environmental variation. As habitat becomes more and more the focus of conservation efforts, it becomes especially important to identify habitats that are most critical to maintaining species diversity as a whole and to determine the area of habitat required to maintain minimum viable populations of most species.

Recent literature indicates that a complex relationship exists between the relative importance of overall forest habitat acreage versus forest habitat patch size and the ultimate response of individual wildlife species (Lee et al. 2002). In general, the greater the amount of habitat within the landscape mosaic, the better. Empirical studies that have examined the independent effects of habitat loss versus habitat fragmentation suggest that habitat loss has a much larger effect than habitat fragmentation on the distribution and abundance of birds (Fahrig 2003). This is supported by other studies that found forest size and edge effects did not significantly affect either nesting success or the productivity of neotropical songbirds (e.g., Friesen et al. 1999). A further consideration is that landscape-scale effects may be different in largely forested environments in the northern part of the Connecticut River watershed compared to largely fragmented environments in the southern portion of the watershed. It is possible that in large forested areas birds respond primarily to local habitat effects (Lichstein et al. 2002) whereas in fragmented landscapes, landscape-scale forest cover may be critical (Trzcinski et al. 1999).

Generally, the nesting success of forest interior-nesting songbirds has declined as forest habitat loss has increased (Wiens 1989, Askins 2002). Focusing our protection efforts on creating large blocks of forest (more likely in the southern portion of watershed), or protecting existing blocks (more likely in the northern portion of watershed) will help to ameliorate the detrimental impacts of forest habitat loss and fragmentation. Forest blocks of a thousand acres or more increase the likelihood of providing habitat for the greatest number of area-sensitive species (Robbins et al. 1989) by providing a diversity of microhabitat conditions. Robbins et al. (1989) investigated the impact of shrinking forest habitat on forest interior species in the Mid-Atlantic States and showed a marked decline in the density and diversity of species in forest blocks smaller than 240 acres. Highly area-sensitive species were rare or did not occur in forest blocks this small.

Landscape-scale impacts from changes in habitat loss and changes in spatial patterns can result and impact species use and distribution. For example, studies of migratory birds indicate that cerulean warbler, yellow-throated vireo, and hermit thrush require a minimum area of 800 to 2,000 acres (Askins 2002). Other examples include the fact that wood thrush demonstrate higher area sensitivity to smaller patch sizes in the northern portion of their range than further south (Rosenberg et al. 2003), and the minimum area requirements for the scarlet tanager may depend on the amount of remaining forest and in the landscape (Rosenberg et al. 2001).

How core forest blocks are organized on the landscape and how they are managed has important consequences for ecological processes as well. We

USFWS

Cardinal flower

envision a pattern of conserved lands across the watershed that includes both "wildlands reserves" and forests that are sustainably managed to improve wildlife habitat (see Foster et al. 2010). Any landscape-scale conservation within the Connecticut River watershed involves an element of cultural influence. Although the landscape was largely forested prior to European settlement, it was highly dynamic in response to changing climatic conditions, natural disturbance processes, and American Indian activities. European settlement in the 17th and 18th centuries initiated a dramatic transformation, as much of the land in the watershed was deforested and farmed and the remainder was logged, grazed or burned. Despite the natural appearance of many portions of the modern landscape, a legacy of intensive past use remains in vegetation structure and composition, landscape patterns, and ongoing dynamics.

The appropriate size of a forest block needed to protect ecological processes is difficult to know, and is dependent upon the ecological process under consideration. TNC and others (TNC 2004; Foster et al. 2010) advocate for forest blocks between 5,000 and a million acres in New England. It's thought that conserving and restoring forests of this size in a matrix of other land uses may:

- Temper the impacts of climate change by supporting complex, aging forests that can store twice as much carbon as young forests.
- Provide rare habitats for a diverse array of plants, animals, and micro-organisms nested within larger, more robust core areas.
- Safeguard lands of natural, cultural, and spiritual significance.
- Serve as unique scientific reference points for evaluation and improvement of management practices elsewhere.

Further, TNC has recommended that large forest blocks be protected to (1) promote resilient forest ecosystems that can absorb, buffer, and better recover from the full range of natural disturbances; and (2) support enough breeding territories for interior forest species to conserve their genetic diversity over generations (TNC 2004). Combining both of those considerations, and evaluating each ecoregion's forested extent, ecology, and natural disturbance history, they conclude that a core forest block in the Lower New England ecoregion (including Connecticut, Massachusetts, and southern New Hampshire) be 15,000 acres minimum in size. In the Northern Appalachian ecoregion (including Vermont and northern New Hampshire), they recommend a core forest block be 25,000 acre minimum in size (TNC 2004).

As we delineated CFAs, we considered these general parameters in the context of the existing network of conserved lands and the Service's population and habitat objectives.

- **Forest Corridors:** Work with partners and willing landowners to facilitate the protection and restoration of travel and dispersal corridors for plants and wildlife. Special consideration will be given to protecting areas that span elevation, latitudinal, and longitudinal gradients. Forest corridors should be at least 300 meters (approximately 1,000 feet) in width to facilitate species movement, or designed to provide the habitat requirements for a target species. Special consideration should be given to forest corridors that connect forest blocks of at least 500 acres to provide movement opportunities to a suite of species, including those with large home ranges, and interior forest specialists. We will work with our partners to promote these general characteristics within the CPAs, emphasizing connections between the network of conserved lands.

Rationale: Conservation biologists generally agree that landscape connectivity enhances population viability for many species and that until recently, most species lived in well-connected landscapes (Noss 1987, Hunter Jr. 1990). Among the most popular strategies for maintaining populations of both plants and animals in fragmented landscapes is to connect current isolated patches with strips of habitat called corridors. We define corridor as a linear habitat, embedded in a dissimilar habitat type matrix, that connects two or more larger blocks of habitat and that is proposed for conservation on the grounds that it will enhance or maintain the viability of specific wildlife populations in the habitat blocks. Further, our definition of corridor also implicitly includes those linear habitats–such as riparian areas (Naiman et al. 1993) in agricultural landscapes–that support breeding populations of many species but do not connect larger habitat patches.

Increasing urbanization within the Connecticut River watershed continues to sever connections between habitat blocks. This habitat fragmentation can lead to an overall reduction in species populations and potentially local extirpation of a plant or animal species (Noss 1987, Fahrig and Merriam 1994, Tewksbury et al. 2002, Fahrig 2003). Species affected by habitat fragmentation become increasingly vulnerable to natural disasters (Pickett and White 1986) and predation (Brittingham and Temple 1983). They are also more susceptible to inbreeding (Young et al. 1996), increasing the prevalence of genetic defects.

Perhaps the best argument for corridors is that the original landscape was interconnected. Corridors are an attempt to maintain or restore some of the natural landscape connectivity (Noss 1987). Habitat corridors provide numerous benefits for plants and animals and can play a critical role for endangered species. The protection, and where necessary, the restoration of habitat connectivity through corridors has been shown to increase the exchange of individuals between habitat patches, promoting genetic exchange and reducing population fluctuations. Corridors provide food and shelter for a variety of wildlife and help with juvenile dispersal and seasonal migrations. The establishment of additional habitat corridors can also benefit people, with underpasses or overpasses for wildlife helping to reduce vehicle collisions with large animals.

Corridor management needs to consider the habitat requirements of the target species, landscape structure and subsequent species response (i.e., movement ability, movement patterns, reaction to boundaries). The utility of these corridors will vary among species; therefore, it is important to determine the function of the corridor (i.e., breeding habitat, dispersal) before management efforts occur. The guideline above is specific for corridors that are to provide species movement opportunities between similar habitats, and act as buffers along riparian and wetland habitats. The distribution of species and the different habitat values within the corridor makes it difficult to determine the precise width. Spackman et al. (1995) suggests a minimum corridor width of 30 to 50 meters (100 to 160 feet) to provide the habitat needs for at least 90 percent of streamside plants, and 75 to 175 meters (245 to 575 feet) for breeding bird species. The suggested terrestrial buffer for amphibians and reptiles ranged from 150 to 290 meters (490 to 950 feet) and 127 to 289 meters (415 to 950 feet), respectively (Semlitsch et al. 2002). Based on these studies, a minimum corridor width of 300 meters (985 feet) for species movement is suggested. This minimum guideline is not species specific, nor does it consider the landscape context. A width greater than 300 meters may be necessary, for example, if human disturbances adjacent to corridors are impacting species use.

Maintaining corridors of forested habitat between larger areas of core habitat can create a network of connected conserved lands across the landscape. In the face of environmental stressors such as climate change and other land uses changes, these networks of core and corridor habitats can help connect not

only areas of similar habitats, but also a diversity of habitats across a range of elevations, latitudes, aspects, soil types, and landform types. These connections will facilitate species movement as they migrate and otherwise adapt in response to these stressors.

- **Diversity of Forest Age, Structure, and Composition:** Work with partners and willing landowners to promote a sustainable range of forest age, structure, and composition that benefits resources of conservation concern and encourages a diverse assemblage of native plants and organisms within the landscape. Within a CPA, between 10 to 15 percent of forested habitats should provide the structural attributes common to early successional forests (e.g., dense shrub and herbaceous ground cover layer, soft mast, and low exposed perches) and a minimum of 15 percent of forested habitats should provide the structural attributes common to late successional forests (e.g., vertically differentiated canopies, higher densities of large snags and downed logs, and small gaps). Early successional forest habitat should be strategically located, recognizing the importance of interior forest habitat, and providing the full suite of habitat characteristics for resources of conservation concern. Ideally, targeted successional stages will be well-distributed across respective eco-regions and ownerships within the Connecticut River watershed and in areas where site conditions favor a prolonged stage of early successional forest.

Rationale: Many forests seem ancient from the time-scale of human lifespans, but they are not ageless, immutable features of the landscape. Their age is limited by the amount of time that has elapsed since a significant disturbance — hurricanes, fire, logging, agricultural clearing, landslide, ice storm, etc. — last set back the clock of ecological succession. Forest succession is paced by changes in the relative abundance and stature of a handful of conspicuous, dominant plants, but along with these species, thousands of plants and animals come and go too —their populations waxing and waning — as succession proceeds. Because of all these changes, managing forests — whether for biodiversity or for particular focal species—requires managing the patterns of succession that determine the age structure and species composition of the landscape.

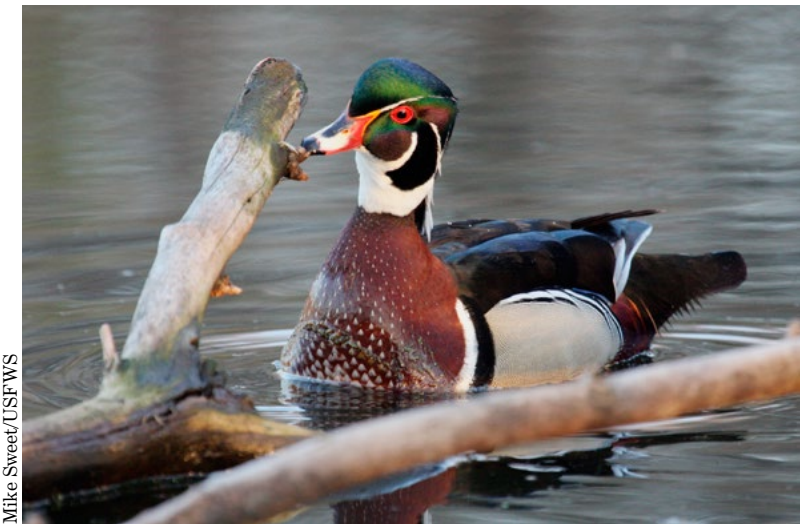
Managing forest landscapes for diversity involves managing patterns of succession for two reasons: (1) some successional stages have more species than others; and (2) each stage has a different, although not usually unique, set of species. Forest management is done principally by controlling stand structure (the ages, sizes, and density of trees within a stand) and forest structure (the sizes and spatial arrangement of stands within a forest). Stand and forest structure appears to be generally more important than tree species composition in providing for habitat, although particular species are sometimes important for certain food requirements. Silvicultural treatments (forest management) can be applied most directly to creating particular stand structures for habitat purposes, just as it is done to meet other objectives. The principles of designing forest structure can partly be drawn from traditional concepts of forest management for sustaining timber production, but additional ideas also apply. In situations where individual animals range over very large areas or when the maintenance of a sustainable population of a species requires a large area (even in cases where individuals have limited ranges) the spatial scale of wildlife management differs from that of timber management. To achieve the goals of providing habitat for populations with large land requirements, the management of individual stands within a CPA will be developed considering the larger regional landscape context. This presents one of the more challenging aspects of forest land management requiring economic, social, and political innovations to coordinate efforts and anticipate actions and long-term trends within the region. Under almost all circumstances, desirable patterns of landscape diversity represent long-term

goals toward which foresters and biologists can work, but they are not patterns that can be created in a few years or even a few decades.

An idealized diversity of successional stages across the landscape of a CPA will take the form of approximately 10 to 15 percent of the acreage in an early successional condition; a minimum of 15 percent in a late successional condition; and the balance falling somewhere along a continuum between these two extremes. The role of the refuge in meeting these targets will depend upon successional diversity of the landscape at time of acquisition.

Late Succession — There is no generally accepted, or universally applicable, definition of late succession. A simple, more or less idealistic, definition would be a "climax forest that has never been disturbed by humans." This becomes unrealistic when considering the long history of landuse in New England. Native peoples regularly set the woods on fire (Day 1953; Cronon 1983; Cogbill 2000); land was cleared for agriculture (Raup 1966; Whitney 1996); and intensive logging removed lumber and pulpwood (Whitney 1996). Ecologists have defined the natural disturbance regimes common to the forests of the watershed–the disturbances that would have created a successional mosaic more free from human disturbances. We can use these studies to develop silvicultural analogs that emulate these forest disturbances and move forest succession toward later successional stages (Franklind et al. 2002; Lorimer and White 2003; Keeton 2006).

Small gap openings in the forest were the most common natural disturbance, which led naturally to a forest structure dominated by late-successional, multi-aged stands (Seymour et al. 2002). The structure and composition of late-successional forest ecosystems have been detailed by ecologists (Franklin et al. 1981, 2007, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010). Four major structural attributes of late-successional forests are: living large-diameter trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory development. Ecological processes include those natural changes that are essential for the development and maintenance of late-successional forest ecosystems. Although the processes that created the current late-successional ecosystems are not completely understood, they include: (1) tree growth and maturation, (2) death and decay of large trees, (3) low to moderate intensity disturbances (e.g., wind, insects, diseases, and ice) that create canopy openings or gaps in the various strata of vegetation, (4) establishment of trees beneath the maturing overstory either in gaps or under the canopy, and (5) closing of canopy gaps by lateral canopy growth or growth of understory trees.



Mike Sweet/USFWS

Wood duck

Many species are dependent on large living trees, large dead trees, or fallen logs, features that are common to late-successional forests but not younger or financially mature forests. These species tend to be small, non-charismatic

species, such as mosses, lichens, fungi, and insects (Hagan and Whitman 2004). Few of the charismatic species (e.g., birds and mammals) appear to be as tightly dependent on large old trees, though some do require large trees. On the White Mountain National Forest, Kursic et al. (1996) found that bat activity within the forest was highest in over-mature hardwood stands (greater than 119 years old), and suggest maintaining areas of older forest as roosting sites. Northern myotis, for example, tend to use tall, wide-diameter, partially-dead trees for roosting, and forest openings for feeding (Caceres et al. 1997). These habitat features are often associated with late successional forests. Bald eagles and osprey require tall, super canopy trees near foraging areas for nesting and roosting. Hollow trees and fallen logs are important den sites for certain mammals, and snags would be used by cavity nesting birds like wood ducks and black-backed woodpeckers. Once old forest elements such as large trees or logs are lost from a stand (e.g., as a result of a clearcut or a selection cut), it can take centuries for the species to return to that location. A species first has to wait for these structural features to redevelop, and then the species must colonize them.

Early succession — Forest disturbances were once viewed as an insult to the "balance of nature" and synonymous with habitat destruction (Marsh 1864). Certain forms of disturbance, however, are now held by ecologists and conservation biologists to play a fundamental role in maintaining the natural heterogeneity in environmental conditions that organisms experience. Early successional forest habitats have become critically uncommon in parts of the eastern United States, especially in the Northeast (Askins 2001; Brawn et al. 2001; Brooks 2003; DeGraaf and Yamasaki 2003), largely in response to forest maturation and land-use development. European settlement resulted in widespread clearing of forests for agriculture, timber, and fuelwood (Whitney 1996). Since that time, the amount and distribution of early-successional habitats has generally declined, especially in southern New England where the amount of early successional forest area has declined 31 percent since the 1950s (Brooks 2003).

The forests in the Connecticut River watershed were historically subject to several sources of disturbance. In much of the region, early-successional habitats were continuously produced in pre-settlement times by fire, wind, beaver, flooding, and Native American agriculture and burning. Many fire-prone areas were settled by Europeans and are now largely developed. Beaver, once extirpated but now increasing, cannot modify the landscape to the extent they did in pre-settlement times. Many drainages are confined or channelized now and beaver generally are not tolerated where key woods roads, suburban development, or agriculture occur. Wind still creates small openings in softwood stands, but mid-successional hardwoods, now predominant across much of southern New England, are fairly resistant to wind, even hurricanes (Foster 1988). The net result is that natural disturbances are much reduced compared to pre-settlement times and cannot be relied upon to produce early-successional habitats where and when they are needed. Most early-successional dependent species are not generalist species; rather, they are specialists in vegetation structure or area requirements.

Analysis of bird survey data in the early 1990s identified population declines of numerous species dependent on early-successional habitats (Vickery 1991, Askins 1998). North American Breeding Bird Survey data indicates that 48 percent of shrubland and 100 percent of grassland birds have declined significantly since 1966 in the northeast (Dettmers 2003). Other research has suggested that populations of other species, such as New England

cottontail are either declining or would generally benefit from additional early-successional habitat. These include various game birds (DeGraaf and Yamasaki 2003), mammals (Scanlon 1992, Litvaitis 2003), reptiles (Scanlon 1992), and rare plants (Latham 2003).

The Connecticut River watershed is now dominated by human uses, and maintaining early and late successional habitats throughout in proportion to presettlement levels is not possible. However, a mix of successional and developmental stages across forested landscapes of the watershed represents potential habitat for a host of important species. Sustainable forestry practices across managed landscapes can contribute to the maintenance of biological diversity and ecosystem functioning (Lindenmayer and Franklin 2002). The challenge lies in:

- Determining the mix of management approaches necessary to achieve sustainability objectives.
- Anticipating trends due to economic and social changes.
- Coordinating responses with other landowners in the conserved land networks.

The approach identified throughout our CCP focuses on the architecture of individual forest stands and their spatial arrangement, with consideration given to the aggregate representation of multiple structural (or habitat) conditions at landscape scales. This is partly in response to a call from researchers for an approach where management creates currently under-represented structures and age classes on some portion of the landscape (Franklin et al. 2002, DeGraaf and Yamasaki 2003, Keeton 2004). In the Connecticut River watershed, this would include managing for late and early successional structures, which are geographically underrepresented relative to pre-European settlement conditions (Whitney 1996, Cogbill 2000, Lorimer 2001, Lorimer and White 2003). The proportion of early-successional habitat in northern industrial forests is currently several times that which occurred in presettlement times (Lorimer and White 2003) and in the southern portion of the watershed, mature forests are a disproportionate fraction of the landscape. Strategic partnerships between public and private landowners and managers to create a landscape that accounts for the characteristic successional and developmental stages—with forest stands ranging from small to large—will facilitate the conservation of biodiversity within the watershed. Utilizing silvicultural systems that more closely emulate natural disturbance and stand development processes will aid in sustaining ecological complexity and biodiversity (Seymour and Hunter Jr. 2000, Ontario Ministry of Natural Resources 2001, Franklin et al. 2007).

- **Forest Wetland Integrity:** Work with partners and willing landowners to maintain the important hydrologic functions and wildlife values of forested wetlands by protecting and restoring natural hydrological regimes and vegetative edges and buffers. These vegetated buffers are a critical component of wetland complexes. The buffer or edge habitat is important to wildlife, as well as wetland water quality. The protection of these wetland and waterway edges may include protection and restoration of floodplain forests, and replacement or installation of culverts or bridges. In particular, work with partners to protect existing floodplain forests identified and mapped by TNC (Marks 2011).

Rationale: Forested wetlands are common within the Connecticut River watershed where moisture is abundant, particularly along rivers and in the mountains. They are best defined as "an area where water is at, near or above

the land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation, and which has soils indicative of wet conditions" (Cowardin et al. 1979). Their vegetation community generally consists of an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Description of hydrologic characteristics becomes more complicated and requires detailed knowledge of the duration and timing of surface water inundation, both yearly and long-term, as well as an understanding of groundwater fluctuations; forested wetlands generally fall into two categories based on water regimes: tidal and non-tidal. The watershed's wetlands include marshes, bogs, floodplain forests, wet meadows, and low prairies.

Habitat destruction has been recognized as a universal threat to biodiversity (Soule 1991). Studies continue to reveal that humans have been significantly altering the landscape since prehistoric times (Cronon 1983, Whitney 1996), and in New England, that effect has dramatically reduced wetland coverage. Wetlands have been drained on a widespread basis on inland as well as coastal sites, and changes in local hydrology have left us with distinctly different habitats and vegetation cover than have occurred historically (Tiner Jr. 1984). Increased population densities and suburban sprawl have often converted these drained wetland areas of natural land to urban, industrial, and agricultural use.

Threats beyond simple wetland destruction are prevalent as well. For instance, poor water quality due to low oxygen conditions or the presence of toxic substances may explain why fish and wildlife communities are impaired when other aspects of suitable habitat appear to be present. Some researchers believe that declines in amphibian populations in apparently pristine habitats may be due to factors such as viruses, acid rain, concentrations of nitrates, or increased exposure to ultraviolet B light (UVB). Wetland plant communities are being detrimentally impacted as well through the introduction of nonnative, invasive plants and insects (Orwig et al. 2003), which can displace native plants reducing biodiversity (Silliman and Bertness 2004).

In the Connecticut River watershed, patterns of glacial deposition strongly influence wetland occurrence and function. Many wetlands are associated with permeable soils and owe their existence to groundwater discharge. Whether developed on soils of high or low permeability, wetlands are often associated with streams and appear to play an important role in controlling and modifying streamflow (O'Brien 1988), minimizing harm to downstream areas. Due to dense vegetation and location within the landscape, wetlands are important for retaining stormwater from rain and melting snow entering rivers and lakes. Wetlands that overlie permeable soils have the capacity to store and filter pollutants ranging from pesticides to animals wastes. The flow characteristics of wetland waters allow particles of toxins and nutrients to settle out of the water column. Larger wetlands and those surrounded by dense vegetation are most effective at protecting water quality.

Where these complex hydrological regimes have been altered by man, recurrent negative effects on migratory and resident wildlife have been realized (Tiner Jr. 1984). A high proportion of the Connecticut River watershed's fish and wildlife species inhabit wetlands during part of their life cycle. Forested wetlands provide breeding habitat for species of conservation concern such as Canada warbler, northern parula, wood duck, and American black duck. Forested wetlands adjacent to the Connecticut River mainstem are important for migrating landbirds (Smith College 2006), and during high water events, migrating waterfowl. Wetlands also provide lifelong habitat for some frogs and turtles, as well as essential habitat for smaller aquatic organisms in the food web, including crustaceans, mollusks, insects, and plankton. Degradation of forested wetlands

and riparian areas can also have impacts on water quality and increase the risk of flooding downstream.

- **Climate Change Adaptation:** Work with partners, willing landowners, and other stakeholders to identify the best forested uplands and wetlands to manage for conservation and natural diversity. Identify corridor and stopover locations that will help connect these lands. Use climate change vulnerability assessments, climate models, and ecological models to prioritize and strategically implement forest management that promotes resistance and resilience, or facilitates transition as species' ranges shift over time. Develop and implement adaptation strategies that allow us to achieve our more specific goals within the watershed (e.g., protecting movement corridors, managing forests to support forest-dependent species, restore forested habitats). Participate in and use outputs from the landscape conservation design modeling effort being led by the North Atlantic LCC. Work with partners to identify likely changes in climate variables over 50 years, the likely impacts of projected climate changes on the abiotic and biotic components of the watershed's existing forested uplands and wetlands, and the habitat suitability for these ecosystems into the future. Monitor changes to forested uplands and wetlands over time and measure the effectiveness of climate change adaptation measures, using an adaptive management strategy to evaluate decisions when necessary.

***Rationale**:* Climate change is increasing the vulnerability of many forests to ecosystem changes and tree mortality through fire, insect infestations, drought, and disease outbreaks (Glick et al. 2011). Changing climatic conditions may affect the establishment and growth of forest species currently present on the Conte Refuge, leading to a shift over time in forest community structure and composition, which could lead to cascading effects on wildlife and overall ecosystem function. The ability of refuge managers to adapt to future climate change will be enhanced by their capacity to alter management regimes relatively rapidly in the face of changing conditions. The lack of fine-scale information about the possible effects of climate changes on locally managed forests limits the ability of managers to weigh these risks to their forests against the economic risks of implementing forest management practices such as adaptation and/or mitigation treatments. This knowledge gap will impede the implementation of effective management on public or private forestland in the face of climate change (Joyce et al. 2014).

Climate change vulnerability assessments provide two essential contributions to adaptation planning. Specifically, they help in identifying which species or systems are likely to be most strongly affected by projected changes, and in understanding why these resources are likely to be vulnerable, including the interaction between climate shifts and existing stressors. Computer models and biological research are used to assess sensitivity, exposure, and adaptive capacity: the three components of a vulnerability assessment. Models are computer-based programs that may be used to simulate a wide variety of ecological processes, and can incorporate the effects of stochastic or fixed stressors. Those models, in conjunction with vulnerability assessments, can then be used to develop strategies for building resistance to climate-related stressors, enhancing resilience in order to improve the capacity of species and systems to persist during changes, and anticipating and facilitating ecological transitions that reflect the changing environmental conditions (Glick et al. 2011).

Modeling can also occur outside the vulnerability assessment framework. In an effort supported by the USFWS and the North Atlantic LCC, a landscape change, assessment, and design model that assess eocsystems and their capacity to sustain fish, wildlife, and plant populations in the northeastern U.S. in the

Putney Mountain wetland

Rachel Cliche

face of urban growth, climate change, and other stressors is being developed by a coalition of partners representing the federal government, states, and nongovernmental organizations. A landscape conservation design for the Connecticut River watershed has been completed that used this model to develop tools and information the Conte Refuge will use to build resistance, enhance resilience, and facilitate transitions among the natural systems in and around Refuge-managed lands (Schwenk and Mallek 2016).

Monitoring of how species and natural systems are reacting to climate impacts and adaptation actions will be a critical part of reducing uncertainty and increasing the effectiveness of management responses (NFWPCAP 2012). We will work with partners to monitor species range shifts, phenological shifts (e.g., changes in flowering time and lengths of growing seasons), changes in precipitation and related effects of surface and groundwater, invasive species, increased wildfire and storm events frequency and intensity, and sea level rise.

Also see the discussion on "Forest Corridors" above.

Objective 1.2 Non-forested Uplands and Wetlands (Freshwater Wetlands, Pasture, Hay and Grasslands)

In cooperation with willing landowners and other partners, protect, manage, and restore non-forested wetlands and uplands within the Connecticut River watershed. These non-forested habitats will help sustain the biological diversity, integrity, and ecological and hydrologic function of the river ecosystem, provide habitat connections and wildlife travel corridors, accommodate anticipated shifts in species' ranges from climate and land use changes, and support dependent species of conservation concern-including migratory birds and federally listed endangered and threatened species.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate the protection, management, and restoration of non-forested uplands and wetlands throughout the watershed, with priority attention to CPAs, include the following:

- **Wetlands Integrity:** Work with partners and willing landowners to facilitate the protection and management of wet meadows, shrub swamps, peatlands and emergent marsh, to ensure the health and persistence of these communities. Prioritize the restoration and maintenance of site specific wetland buffers that provide habitat functions for wetland-associated fauna, and filter nutrients and contaminants. We will use the following criteria to prioritize efforts:

  * Emphasize rehabilitation of wetlands in headwater areas for groundwater discharge and recharge and floodplains for flood attenuation.

  * Focus on the control of invasive plant and animal species, and the restoration of native species.

Rationale: Wetlands include a wide range of plant communities that have adapted to being inundated by or saturated with water for varying periods during the growing season. Non-forested wetlands within the Connecticut River watershed include shrub swamps, wet meadows, peatlands, and emergent marsh, and make up only 1.4 percent of the watershed.

Wetlands, overall, are influenced from natural disturbances and succession. However, beavers play an important role in the disturbance regime and maintenance of non-forested wetlands, especially in mostly forested landscapes where natural openings are uncommon. Beavers are associated with riparian areas, where their dam building activities alter the hydrology and flood low lying areas creating a mosaic of wetlands. These wetlands provide a diversity of vegetation types, are rich with invertebrates, and are valuable for waterfowl, landbirds, amphibians and reptiles (Gauthier and Aubry, 1996, Chandler et al. 2009, Thompson et al. 2000). Regardless whether the habitat has been modified by beaver activity or by some other natural disturbance, non-forested wetlands in the watershed are essential to a variety of species, and provide critical habitat to wildlife throughout various life stages.

As is the case with many of the habitats in the watershed, development is a threat to the integrity of these wetland types. Commercial and residential development adjacent to wetlands introduces pollutants which decrease water quality. Roads and man-made ditches fragment wetlands and alter the hydrology. Nonnative invasive species are a common occurrence near developed areas, and when introduced to wetland habitats compete with native species.

Amercian woodcock

Carlos Guindon/USFWS

Wetlands in the Connecticut River watershed are valuable from an ecological and economic view point. Non-forested wetlands contribute to the diversity within the landscape, and provide critical habitat for a variety of wildlife species, some of which are species of conservation concern. American woodcock, for example, is declining across its range, and is dependent on shrub swamps for daytime cover and feeding (Kelley et al. 2008, Sepik et al. 1994). American black duck rely on the abundance of invertebrates and wetland vegetation to feed their young, and dense wetland vegetation to conceal nesting sites (Longcore et al. 2000, DeGraaf et al. 2001). Wetlands adjacent to the Connecticut River mainstem provide significant stop-over and wintering habitat for a diversity waterfowl species, and feeding areas for migratory shorebirds.

Wetlands adjacent to rivers and streams protect inland areas from flooding by reducing water velocities and peak flows immediately downstream. Wetland vegetation stabilizes shorelines and reduces the risk of erosion. This prevents the loss of property, reduces sediment delivery to water bodies, and helps maintain stream channels. Wetlands also play a significant role in water-quality improvement, by filtering nutrients and contaminants (EPA 2001, Thompson et al. 2000). The protection and management of these wetland communities in the watershed is essential to maintain habitat and wildlife diversity, and local property values.

- **Grasslands, Old Fields, Shrublands, Pasture and Hayfields:** Work with partners and willing landowners to facilitate the protection of open habitats such as grasslands, old fields, shrublands, pasture and hayfields, and to ensure restoration and the long-term management of these important habitats to complement the surrounding landscape. Priority for protection and/or restoration should be given to open habitats that have high development pressures, are within an active floodplain, or can provide critical habitat for Federal or State listed species, or other species of conservation concern. Continuing support for pasture and hayfield management over the short-term may be warranted to facilitate long-term goals for sustaining grasslands, old field, and shrublands. However, if working pasture and hayfields are incorporated into the refuge, they will be evaluated on a case-by-case basis to evaluate management actions that would support long-term habitat objectives.

Rationale: In the section above titled "Actions Common to All Alternatives," we emphasize that we support the continuation of working agricultural lands and agricultural land protection programs because of their significance to communities in the watershed. However, there may be circumstances when a farmer is selling their farmland and another agricultural landowner is not available. Their only choice may be to either sell to a developer or a conservation landowner. We promote the latter choice if the lands have important conservation values.

Grasslands, old fields, shrublands, pasture, and hayfields are our descriptions of agricultural fields that are no longer in commercial production, but may be currently, or recently, managed to maintain open conditions through grazing, mowing, brushing, or burning. Disturbance adapted plant communities are often present, and typically include forbs, grasses, shrubs, and small trees.

These open habitats are prime areas for commercial or residential development. As development pressure increases in the watershed, many of these areas will be replaced by urban sprawl, impacting the integrity of the watershed's ecosystems. Many agricultural fields within the watershed, for example, are located in floodplains, and development of these areas would not only impact adjacent and downstream riparian habitat and remaining agricultural lands, but also upland habitats through fragmentation and flooding. Development within these areas

would introduce pollutants to rivers and streams, increase the number of invasive nonnative species and urban predators, and interrupt ecological functions, such as a floodplain's ability to effectively retain high water levels during a flooding event.

Conservation and restoration of open habitats, especially those located in a floodplain, will not only increase ecological integrity and protect human property, but will also provide habitat for wildlife including species of conservation concern. Blue-winged warbler, American woodcock, and New England cottontail, for example, are declining species that require shrub dominated habitats, and contiguous tracts of grassland habitat would benefit declining grassland dependent birds. The watershed is a major migration corridor. Migrating landbirds concentrate in habitats along the Connecticut River mainstem (Smith College 2006), and protection or restoration of these open habitats would provide important stop-over habitat.

A landscape scale approach is needed to determine the appropriate management objectives for these open habitats. Consistency with adjacent land management and habitat types will provide a more contiguous, resilient, and functional landscape. The management focus should be on restoration of natural communities and providing habitat for species of conservation concern.

- **Climate Change Adaptation:** Work with partners, willing landowners, and other stakeholders to identify the best non-forested uplands and wetlands to manage for conservation and natural diversity. Identify corridor and stopover locations that will help connect these lands. Use climate change vulnerability assessments, climate models, and ecological models to prioritize and strategically implement wetland, agricultural, and grassland management that promotes resistance and resilience, or facilitates transitions as species' ranges shift over time. Develop and implement adaptation strategies that allow us to achieve our more specific goals within the watershed (e.g., protecting movement corridors, managing freshwater wetlands, agricultural areas, and grasslands to support dependent species, restore wetland and grassland habitats). Participate in and use outputs from the landscape conservation design modeling effort being led by the North Atlantic LCC. Work with partners to identify likely changes in climate variables over 50 years, the likely impacts of projected climate changes on the abiotic and biotic components of the watershed's existing non-forested uplands and wetlands, and the habitat suitability for these ecosystems into the future. Monitor changes to non-forested uplands and wetlands over time and measure the effectiveness of climate change adaptation measures, using an adaptive management strategy to evaluate decisions when necessary.

***Rationale**:* Climate change is increasing the vulnerability of many freshwater wetlands, grasslands, and agricultural lands to ecosystem changes and disturbances like invasive species, shifting precipitation regimes, and extreme weather events. Changing climatic conditions may affect the establishment and growth of species currently present on the non-forested uplands and wetlands of the Conte Refuge, leading to a shift over time in community structure and composition, which could lead to cascading effects on wildlife and overall ecosystem function. The ability of refuge managers to adapt to future climate change will be enhanced by their capacity to alter management regimes relatively rapidly in the face of changing conditions. The lack of fine-scale information about the possible effects of climate changes on locally managed non-forested lands limits the ability of managers to weigh these risks against the economic risks of implementing wetland, grassland, or agricultural land management practices such as adaptation and/or mitigation treatments. This knowledge gap will impede the implementation of effective management on public or private land in the face of climate change (Joyce et al. 2014).

Please see Rationale for guideline "Climate Change Adaptation" under Objective 1.1.

Objective 1.3 Inland Aquatic Habitats (Freshwater Rivers, Streams, Ponds and Lakes)

In cooperation with willing landowners and other partners, protect and restore in-stream and riparian habitat structure and function, and restore aquatic species passage and water quality within the Connecticut River watershed to improve the ecological integrity and environmental health of the river ecosystem and enhance habitat for migratory and inter-jurisdictional fish, mussels, and other native aquatic species of conservation concern.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate the protection, management, and restoration of inland aquatic habitats throughout the watershed, with priority attention to CPAs, include the following:

- **Habitat Assessments:** Work with partners, State natural resource agencies, and willing landowners to facilitate the development and use of effective and efficient tools to evaluate aquatic habitat conditions and water quality across the watershed in an effort to improve the ecological integrity and environmental health of the river ecosystem. Assessment may include physical, chemical, or biological attributes and results will direct the planning and prioritizing of management and restoration activities.

***Rationale**:* Aquatic habitats include streams, rivers, lakes, and ponds. Lakes and ponds are bodies of standing or slow moving water often located in hollows formed by past glacier, tectonic activities, and by humans. Water levels are influenced by rainwater, groundwater, or most often by streams and rivers. Lakes and ponds provide habitat for a diversity of organisms that perform different ecological functions. Plankton, for example, are microscopic organisms that are food for larger aquatic vertebrates, such as fish and amphibians. Waterfowl rely on lakes and ponds as staging areas during migration, and feeding areas for broods during the breeding season. Mammals, such as bats, rely on these habitats as a source of drinking water. Several federally listed invertebrates also rely on these habitats: the federally threatened Puritan tiger beetle and the federally endangered dwarfwedge mussel.

Streams and rivers are bodies of flowing water confined to a stream channel (consisting of a stream bed and banks) that start from a headwater (i.e., lakes, spring, snowmelt) and move to its mouth (i.e., another body of water). Stream ecosystems extend well beyond the channel, taking in the entire stream corridor. The stream corridor is comprised of the stream channel, streambanks, the hyporheic zone (i.e., region beneath and alongside a stream bed, where there is mixing of shallow groundwater and surface water), and the surrounding riparian and floodplain area. Stream corridors are extremely productive in terms of fish and wildlife resources. The stream ecosystem encompasses, connects, and integrates both aquatic and terrestrial habitat. Healthy stream corridors and floodplains provide tremendous (and sometimes the only) habitat for fish and wildlife. Stream corridors offer all the elements for aquatic life: food, water, shelter, and habitat connectivity (travel lanes). Stream corridors with intact floodplains are subject to flooding and drought but are resilient and quick to recover when the forces of flows and sediment transport are at equilibrium. Equilibrium is maintained by allowing streams access to their floodplains, retaining native vegetation, and retaining the appropriate stream dimension, pattern, and profile (Saldi-Caromile et al. 2004).

On average there are seven dams interrupting every 100 miles of river in the Northeast. Industrial, agricultural, urban and suburban development over the years has resulted in mankind moving, straightening and confining streams and rivers in an effort to force the flows to move in a pattern deemed more desirable to humans. Mankind has destabilized untold miles of river and stream due to our

collective lack of understanding that a river must have access to its floodplain to avoid catastrophic flood damage and must move in a specific pattern, width and depth to maintain stable banks and transport water, sediment load, and woody material. Past practices to accommodate land development included re-aligning streams, straightening streams, diking streams (cutting off the river's access to its floodplain), channelizing streams, removal of riparian vegetation (which exposes banks to erosion), creation of fish passage barriers (dams, culverts, pollution, temperature, exposure), narrowing streams and armoring (e.g., riprap, concrete), water diversions, construction in floodplains, construction of impervious surfaces (thus accelerating and intensifying runoff), and eliminating large woody material in channels (Saldi-Caromile et al. 2004, Martin et al. 2011).

We now have a new understanding of how streams and floodplains operate and appreciation of the costs of past practices and benefits of more sustainable approaches. We no longer think of streams as pipes moving water but instead as complicated systems responding to geology, physics, hydrology, hydraulics, and ecology. We now recognize relationships between valley and stream slope, stream shape, stream sediment transport capacity, flow regimes, floodplain function, and stream stability and we can predict how streams will respond to disturbances and restoration efforts.

Stable stream channels with access to their floodplains are resilient to flooding and drought and provide habitat and refuge during a variety of climate conditions. Structural complexity within a stream and floodplain creates an array of microhabitats that provide for the needs of an assortment of species through their various life stages. Structural complexity in the stream consists of riffle and pools, variation in the stream bottom and banks, and large woody material. Structural complexity in the floodplain consists of a variety of plant species at a variety of heights and ages and a complex riparian zone that consists of downed and regenerating trees. The complex channel/floodplain structures generate hydraulic complexity (i.e., varying flow velocity, depth, direction and turbulence) throughout a range of flow conditions. This is critical to meeting the diverse needs of aquatic organisms through all life stages (Saldi-Caromile et al. 2004). Stream corridors provide habitat for priority Federal trust species such as inter-jurisdictional fish, migratory birds, threatened and endangered species, and species of concern.

- **Population Assessments:** Work with the Connecticut River Atlantic Salmon Commission (CRASC), other Service programs, partners, State agencies, and willing landowners to conduct short and long-term inventory and monitoring programs for migratory and inter-jurisdictional fish, rare invertebrates, and other native aquatic species of conservation concern in an effort to restore and maintain healthy populations within each species' historic range. Continue support for aquatic species programs, recovery plans, and other initiatives (e.g., stocking programs, the Connecticut River Diadromous Fish Restoration Program, and the Eastern Brook Trout Joint Venture) (See also goal 4).

Rationale: The goal of the Service is to achieve fisheries populations within the watershed that contain desired representative age classes, size classes, sex ratios, and repeat spawners all in adequate abundance to be resilient and self-sustaining. Short and long-term monitoring programs are designed to provide critical information that will inform management options. For example, assessments may be designed to: detect changes in population size, distribution or range, age structure, health and disease status, virgin vs. repeat spawners, individual growth, fish condition, spawning success or juvenile production, genetic variability, sources of mortality (e.g., impingement and entrainment at power stations), and stocking considerations. Some of these data or metrics are required annually for States to be in compliance with the Atlantic States

Marine Fisheries Commission's Fishery Management Plans (e.g., American shad, blueback herring), or fisheries may be closed by Federal law.

Within the watershed, native fish species and other aquatic organisms (including invertebrates such as dwarf wedgemussel, Puritan tiger beetle, and cobblestone tiger beetle) face numerable challenges to survival and reproduction. To flourish, aquatic species must have access to healthy ecosystems and be able to move throughout the river network. Currently, individuals must overcome a variety of challenges: fish passage barriers (e.g., dams, culverts, stream degradation), competition with nonnative species, water quality and quantity, inappropriate commercial and recreational take, stream corridor habitat degradation, disease, hydropower dams and turbines, impingement and entrainment on water diversions.

Diadromous fishes are of particular importance in the watershed. Many migratory fish species are considered Federal trust species and are the focus of large coordinated restoration efforts through the CRASC. These species are often considered keystone species from which we can deduce the health of many associated species based on the presence and health of these migratory species. Diadromous fish species cannot survive unless they migrate. Critical life stages are dependent upon different habitat types (e.g., freshwater and marine environments) and the fish must be able to migrate long distances to and from these habitat types. Due to this critical migratory behavior, the Service and its partners must monitor populations to evaluate the effectiveness and sustainability of fishways at barriers (i.e., are fishways moving adults and juvenile fish upstream and downstream safely?) and assess the impacts of other variables, natural or man-induced, that affect fish health and movement. The fish response to changing environmental conditions can be interpreted through a combination of activities such as fishway counts, tagging and telemetry, studies on rates of movement, studies on short-term and long-term effects related to barriers or fishways. Some of these data or metrics are required annually for states, as outlined in the Atlantic States Marine Fisheries Commission's Fishery Management Plans (e.g., American shad, blueback herring), or fisheries may be closed by Federal law.

- **Stream and Floodplain Functions:** Work with partners, State natural resource agencies, and willing landowners to maintain and restore in-stream, riparian, and floodplain habitats, sustain hydrological connectivity (e.g., restoration of floodplain forest, stream connectivity, or improve aquatic species passage), and improve stream structural features (e.g., increase woody material or restoration of streamside buffers) and water quality (e.g., reduce nutrient run-off) in an effort to improve ecological integrity, environmental health, and aquatic species habitat.

Rationale: As mentioned above in the habitat assessment guideline under Objective 1.3, stable stream channels with connectivity to their floodplains are resilient to flooding and drought and provide habitat for wildlife during a variety of climate conditions. Many aquatic resource managers understand the significance of restoration and maintenance of these connected systems, but are hindered with limited staff and funding. This challenge requires a strategic approach to ensure that conservation investments and efforts provide the most benefit to the resource. Many conservation groups are working in partnership to pull together resources and expertise to accomplish common aquatic ecological goals. TNC, for instance, formed a Northeast Connectivity Workgroup to strategically assess barriers to fish passage in the Connecticut River watershed, and the Eastern Brook Trout Joint Venture is a unique partnership working toward brook trout conservation. The support of such initiatives is essential, especially in the face of climate change and increasing developmental pressures on the Connecticut River aquatic ecosystems.

- **Hydrological Modeling:** Work with partners to support the development of hydrologic models within the Connecticut River watershed. Specifically, models that advance our understanding of existing impacts (e.g., dams and roads) and projected future impacts (e.g., climate and land use change) would serve as valuable planning and prioritization tools. Further, models that characterize the impact of dam operations on water flow regimes within the watershed, and the resulting impacts on fish and other aquatic species populations, riparian vegetation, floodplain vegetation, and river meadows could inform a recommended seasonal and annual flooding regime.

Rationale: Models are computer based programs that simulate processes under various stressors. Hydrological models, for example, simulate the hydrological process, and its response to environmental and human induced stressors (i.e., storm surges, dams). Modeling is used as a tool to better understand complex problems, and provide guidance to decision makers. Hydrological models for the Connecticut River watershed are being developed as part of a Northeast Climate Science Center-led project, also co-funded by The Nature Conservancy and the US Army Corps of Engineers. These models will be used by multiple conservation agencies as a tool to assist with strategic habitat conservation efforts. Existing data will be entered into these models to assess current hydrological ecosystem functions and predict how these ecosystems may respond to landscape changes. The study has resulted in a full calibrated hydrology model of the Connecticut River Basin, a set of 112 different future hydrology scenarios associated with climate change, and a simulation and optimization model of the major reservoirs in the basin.

- **Climate Change Adaptation:** Work with partners, willing landowners, and other stakeholders to identify the best instream and riparian habitat to manage for conservation and natural diversity. Identify corridor and stopover locations that will help connect riparian habitats. Identify key aquatic passage locations that will help restore or maintain aquatic connectivity within the waterhsed. Use climate change vulnerability assessments, climate models, and ecological models to prioritize and strategically implement aquatic and riparian habitat management that promotes resistance and resilience, or facilitates transitions as species' ranges shift over time. Develop and implement adaptation strategies that allow us to achieve our more specific goals within the watershed (e.g., protecting movement corridors, improving aquatic connectivity, managing and restoring aquatic ecosystems and riparian habitats to support dependent species). Participate in and use outputs from the landscape conservation design modeling effort being led by the North Atlantic LCC. Work with partners to identify likely changes in climate variables over 50 years, the likely impacts of projected climate changes on the abiotic and biotic components of the watershed's aquatic and riparian ecosystems, and the habitat suitability for these ecosystems into the future. Monitor changes to these systems over time and measure the effectiveness of climate change adaptation measures, using an adaptive management strategy to evaluate decisions when necessary.

Rationale*:* Climate change is increasing the vulnerability of many aquatic and riparian ecosystems to ecosystem changes and disturbances like invasive species, shifting precipitation regimes, and extreme weather events. Changing climatic conditions are raising water temperatures and changing stream flows, affecting productivity and decomposition, and disrupting food web relationships. Water temperature affects the physiology, behavior, distribution, and survival of freshwater organisms, and even slight changes can have an impact . Water temperature increases will allow the geographic area suitable for warm-water aquatic species to expand. The number of streams with temperatures suitable for warm-water fish and other freshwater organisms is projected to increase. This would likely mean a concomitant decline of coldwater fisheries habitat. These

Salt marsh

©Chuck Fullmer

changes will help some species and hurt others (NFWPCAP 2014). Precipitation changes in the Northeast are expected to occur as higher precipitation and runoff in the winter and spring, which can have a variety of effects. It may create wider floodplains, alter habitat, increase connectivity, displace riparian and bottom-dwelling species, or further distribute invasive species. As the climate warms, altered precipitation patterns may manifest as heavy storms that punctuate extended periods of hot, dry weather, yielding floods. Heavy storms will also cause increased run-off with associated erosion, sedimentation, and pollution (Hayhoe et al. 2008, NFWPCAP 2014).

The ability of refuge managers to adapt to future climate change will be enhanced by their capacity to alter management regimes relatively rapidly in the face of changing conditions. The lack of fine-scale information about the possible effects of climate changes on locally managed non-forested lands limits the ability of managers to weigh these risks against the economic risks of implementing wetland, grassland, or agricultural land management practices such as adaptation and/or mitigation treatments. This knowledge gap will impede the implementation of effective management on public or private land in the face of climate change (Joyce et al. 2014).

Please see Rationale for guideline "Climate Change Adaptation" under Objective 1.1.

Objective 1.4 Coastal Non-forested Uplands (Coastal Beaches and Rocky Shores)

In cooperation with willing landowners and other partners, protect, manage, and restore coastal non-forested uplands within the Connecticut River watershed. These non-forested habitats will help sustain the biological diversity, integrity, and ecological and hydrologic function of the river estuary ecosystem, provide habitat connections and wildlife travel corridors, accommodate anticipated shifts in species' ranges from climate change and land use changes, and support coastal upland-dependent species of conservation concern including migratory birds and Federally listed endangered and threatened species.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate the protection, management, and

restoration of coastal non-forested uplands throughout the watershed, with priority attention to CPAs, include the following:

- **Habitat Restoration:** Work with partners and willing landowners to support the Long Island Sound Study (LISS) Habitat Restoration Initiative (HRI) goals and objectives to (1) restore the ecological functions of degraded and lost habitats; (2) restore at least 2,000 acres of coastal habitats and 100 miles of riverine migratory corridor habitat; and (3) to allow for the landward migration of coastal wetlands, and (4) use partnerships to accomplish restoration objectives so as to leverage financial resources from multiple public sources.

Rationale: Long Island Sound is an estuary of the Atlantic Ocean located between Connecticut and Long Island, New York. Over eight million people live within the Sound's watershed, and several large cities are situated on its shoreline (Connecticut River Watershed Council 2012). Estuaries are known to be quite diverse ecosystems, and the Long Island Sound is no exception. It was designated by Congress as an Estuary of National Significance for providing habitat for thousands of species, as well as numerous opportunities for commercial and recreational activities (Long Island Sound Study 2012).

Unfortunately, this estuary has also been heavily impacted from past and current land uses. Increased development has introduced pollutants, including sewage, industrial toxins, pathogens, and man-made debris that has impacted the Sound's water quality. The Environmental Protection Agency and the states of New York and Connecticut recognized the need to focus on improving the overall health of the Sound's ecosystem. They formed a partnership in 1985 called the LISS that consists of Federal and state agencies, user groups, citizens and organizations interested in the restoration and protection of the Sound. The LISS wrote a Comprehensive Conservation and Management Plan (1994) that provides goals and management recommendations to restore the Sound. Since 1998, the LISS partners have focused on hypoxia (oxygen depletion), habitat restoration, public involvement and education, and water quality monitoring (Long Island Sound Study 2012).

The Connecticut River enters Long Island Sound near Lyme, Connecticut, and provides almost 70 percent of the freshwater to this estuary (Connecticut River Watershed Council 2012). The health of Long Island Sound is directly tied to the health of the Connecticut River. Restoration efforts of Long Island Sound should not only focus at the mouth of the Connecticut River, but within the entire Connecticut River watershed. The LISS partnership provides an opportunity to pull together resources and expertise to accomplish this goal.

- **Public Use Management:** Provide information to partners and willing landowners to support informed decisions about balancing human use of shorelines with the needs of nesting birds of conservation concern and sensitive dune habitats. Promote the use of signage and fencing, the planting of dense vegetation such as beach plum, and construction of permanent pathways over sensitive dunes to encourage access that minimizes habitat damage. In highly sensitive and/or dynamic areas, work with partners and landowners to eliminate dune access, and identify alternative access points.

Rationale: Coastal beaches and dunes are located at the mouth of the Connecticut River, where erosion, water movement, and wind current influence the creation of these habitat types. These coastal systems are not a prominent feature within Long Island Sound, however, due to the absence of significant wind and water activity, and the available source of erodible sand. Many of the beaches formed in Long Island Sound are from sand that is deposited in long strips parallel to the shoreline, and often extend across the mouth of rivers (Long Island Sound Study 2003). These coastal habitats are dynamic systems, and are often characterized by vegetation that withstands constant wind and wave

action, fluctuating temperatures, and salt spray. Species such as beach plum and American beach grass, have adapted to this harsh environment, but are sensitive to disturbances such as constant foot traffic. Beaches and dunes also provide critical habitat for a diversity of wildlife, including rare, endangered and threatened species. Piping plover, for example, is a federally listed species that nests on non-vegetated beaches in Long Island Sound, including at the mouth of the Connecticut River. These habitats are also important for providing protection to inland areas from coastal storms, dissipating effects from strong winds and tide surges.

Residential development of these areas has created a more static system by impeding the natural movement of sand. This affects species of native wildlife that depend on the more dynamic, natural coastal processes. Development also increases erosion as native beach vegetation is removed, or sometimes a portion of a dune is removed to improve the view for residents. Sensitive beach vegetation can be trampled from the creation of foot paths, or vehicle use. Recreational activities can also disturb wildlife species that are nesting or feeding in these habitats. The presence of nonnative species tends to increase with residential development and recreational activities. Nonnative plants are competing and replacing native beach vegetation and increased predation from domestic pets are impacting nesting wildlife species. Other threats include oil spills, and rising sea levels attributed to climate change.

Protecting and restoring this dynamic ecosystem is critical to maintaining the ecological and economic integrity of Long Island Sound. Coastal beaches and dunes provide vital habitat for rare, endangered and threatened species; many of which have adapted to and require this sometimes harsh and shifting environment. In addition, these coastal systems provide protection to inland habitats from coastal storms, and provide numerous recreational activities. An economic study, commissioned by the LISS, determined that beach recreation in Long Island Sound contributed millions of dollars to the local economy (Long Island Sound Study 2003). The value of these coastal habitats to provide reliable recreational opportunities and shoreline protection to local communities is contingent on the ecological strength and integrity of these ecosystems.

- **Climate Change Adaptation:** Work with partners, willing landowners, and other stakeholders to identify the best coastal non-forested uplands to manage for conservation and natural diversity. Identify corridor and stopover locations that will help connect these lands. Use climate change vulnerability assessments, climate models, and ecological models to prioritize and strategically implement management of coastal beaches and rocky shores that promotes resistance and resilience, or facilitates transition as species' ranges shift over time. Develop and implement adaptation strategies that allow us to achieve our more specific goals within the watershed (e.g., protecting movement corridors, managing beaches and rocky shores to support coastal upland-dependent species, sustain the river estuary ecosystem). Participate in and use outputs from the landscape conservation design modeling effort being led by the North Atlantic LCC, sea level rise models in development by USGS, and other research that can inform the development of adaptation strategies. Work with partners to identify likely changes in climate variables over 50 years, the likely impacts of projected climate changes on the abiotic and biotic components of the watershed's existing coastal non-forested uplands, and the habitat suitability for these ecosystems into the future. Monitor changes to coastal non-forested uplands over time and measure the effectiveness of climate change adaptation measures, using an adaptive management strategy to evaluate decisions when necessary.

Rationale: Climate change is increasing the vulnerability of many non-forested coastal uplands to ecosystem changes. Sea level rise is a key driver of vulnerability because it causes coastal geomorphologic change. The immediate

effects of sea level rise are the submergence and increased inundation of coastal land and increased salinity in estuaries and coastal rivers. Additional physical effects include increased erosion, changes in geomorphology, and saltwater intrusion in groundwater and into tidal freshwater marsh systems. Sea level rise also will exacerbate flooding events ranging from spring tides to tropical or extratropical storms, and will cause inland penetration of storm surge into areas not accustomed to inundation. These areas will likely experience flooding more often. Increased coastal flooding and inundation may result in release of contaminants from coastal soils, sediments, and infrastructure and increased exposure of fish, wildlife, and plants to these pollutants. While sea level changes have occurred repeatedly in the geologic past, changes of similar magnitude have not occurred since construction of modern human infrastructure along coastal areas, and the accelerated pace of sea level rise in the 20th and 21st centuries raises questions about how coastal ecosystems will respond (NFWPCAP 2014).

Increased storm wind strength due to elevated sea surface temperatures could lead to increases in wave height and storm surge and would be magnified by a higher sea level. The primary impacts associated with more intense storm systems include increased flooding and erosion. More intense storms, coupled with common manmade ecosystem alterations such as shoreline stabilization measures that impede or eliminate long-shore transport could lead certain beaches (and their habitats) to fragment and disappear instead of migrating and rebuilding. Impacts to coastal and estuarine beaches would affect biota such as: microscopic invertebrates that are critical to the food web; horseshoe crabs that rely on beaches for egg deposition; and migratory shorebirds that feed on the eggs, such as the red knot. Shifts in the seasonal distribution of major storm events could also affect plants, wildlife, and fish. For example, an increase in the number or intensity of storms during the spring and early summer could substantially affect breeding success of coastal birds such as the piping plover. More infrequent but intense precipitation events can also lead to scouring of sediment and vegetation during peak flows, redistribution of sediment, resuspension of contaminated sediments, as well as increased pollutants from events such as combined sewer overflows (NFWPCAP 2014).

The ability of refuge managers to adapt to future climate change will be enhanced by their capacity to alter management regimes relatively rapidly in the face of changing conditions. The lack of fine-scale information about the possible effects of climate changes on locally managed coastal non-forested uplands limits the ability of managers to weigh these risks to their forests against the economic risks of implementing adaptation and/or mitigation treatments. This knowledge gap will impede the implementation of effective management on public or private beaches or rocky shores in the face of climate change (Joyce et al. 2014).

Please see Rationale for guideline “Climate Change Adaptation” under Objective 1.1.

Objective 1.5 Coastal Wetlands and Aquatic Habitats (Tidal Salt Marsh and Estuary)

In cooperation with willing landowners and other partners, protect, manage, and restore coastal wetlands and other coastal aquatic habitats within the Connecticut River watershed. These coastal aquatic habitats will sustain the biological diversity, ecological integrity, and hydrologic function of the river ecosystem, provide habitat connections and wildlife travel corridors, accommodate anticipated shifts in species’ ranges from climate and land use changes, and support coastal wetland-dependent species of conservation concern-including inter-jurisdictional fish, native aquatic species, waterfowl and wading birds and Federally listed endangered and threatened species.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate the protection, management, and restoration of coastal wetlands and aquatic habitats throughout the watershed, with priority attention to CPAs, include the following:

- **Habitat Restoration:** Work with partners and willing landowners to support the LISS HRI goals and objectives to (1) restore the ecological functions of degraded and lost habitats, (2) restore at least 2,000 acres of coastal habitats and 100 miles of riverine migratory corridor habitat, and (3) use partnerships to accomplish restoration objectives so as to leverage financial resources from multiple public sources. Work with partners to restore salt and brackish marshes by remediating drainage ditches; remove water control structures such as tide gates to restore natural tidal flows; and control invasive species populations like common reed (*Phragmites*) to improve species diversity and habitat function.

Rationale: Please see Rationale for guideline "Habitat Restoration" under Objective 1.4.

- **Population Assessments:** Work with partners, State natural resource agencies and willing landowners to conduct short and long-term monitoring programs for migratory and inter-jurisdictional fish, mussels, and other native aquatic species of conservation concern.

Rationale: Please see Rationale for guideline "Population Assessments" under Objective 1.3.

- **Climate Change Adaptation:** Work with partners, willing landowners and other stakeholders to identify the best coastal wetlands and aquatic habitats to manage for conservation and natural diversity. Identify corridor and stopover locations that will help connect these areas. Use climate change vulnerability assessments, climate models, and ecological models to prioritize and strategically implement management of tidal salt marshes and estuaries that promotes resistance and resilience, or facilitates transition as species' ranges shift over time. Develop and implement adaptation strategies that allow us to achieve our more specific goals within the watershed (e.g., protecting movement corridors, managing tidal salt marshes and estuaries to support coastal upland-dependent species, sustain habitat for waterfowl and wading birds).

  Work with partners to develop and use coastal system models in the watershed that would advance our understanding of existing impacts (e.g., stormwater and contaminants runoff) and projected future impacts (e.g., climate change, sea level rise, and marsh migration) and support local decisions on land use. For example, develop a model to characterize the role of storm water and other sources of contaminants runoff in degrading coastal habitats and help identify where best to locate sediment control structures to prevent further deposition, or use the Sea Level Affecting Marshes Model (SLAMM), a web browser-based application that visually shows the modeling of sea level rise predictions, and other analyses to predict where inland migration of tidal marsh and other tidally influenced habitats may occur. Implement habitat protection and management in accordance to the recommendations of such modelling. Participate in and use outputs from the landscape conservation design modeling effort being led by the North Atlantic LCC, sea level rise models in development by USGS, and other research that can inform the development of adaptation strategies.

  Work with partners to identify likely changes in climate variables over 50 years, the likely impacts of projected climate changes on the abiotic and biotic components of the watershed's existing coastal wetlands and aquatic habitats, and the habitat suitability for these ecosystems into the future. Monitor changes to coastal wetlands and aquatic habitats over time and measure the effectiveness of climate change adaptation measures, using an adaptive management strategy to evaluate decisions when necessary.

Rationale: Climate change is increasing the vulnerability of many coastal wetlands and aquatic habitats to ecosystem changes. Sea level rise is a key driver of vulnerability because it causes coastal geomorphologic change. The Connecticut River watershed is tidally influenced from Long Island Sound to Hartford, Connecticut. In general, the immediate effects of sea level rise are the submergence and increased inundation of coastal land and increased salinity in estuaries and coastal rivers. Additional physical effects include increased erosion, changes in geomorphology, and saltwater intrusion in groundwater and into tidal freshwater marsh systems. Sea level rise also will exacerbate flooding events ranging from spring tides to tropical or extratropical storms, and will cause inland penetration of storm surge into areas not accustomed to inundation. These areas will likely experience flooding more often. Increased coastal flooding and inundation may result in release of contaminants from coastal soils, sediments, and infrastructure and increased exposure of fish, wildlife, and plants to these pollutants.

While sea level changes have occurred repeatedly in the geologic past, changes of similar magnitude have not occurred since construction of modern human infrastructure along coastal areas, and the accelerated pace of sea level rise in the 20th and 21st centuries raises questions about how coastal ecosystems will respond. To preserve the current acreage of tidal wetlands, either wetlands need to keep pace with sea level rise or migrate inland to adjacent lands that are undeveloped. The success of wetland migration depends on the availability and slope of an upland corridor, the pace of the sea level rise, erosion rates, and the potential for wetland accretion. Because the Connecticut River is free-flowing from Long Island Sound to Holyoke, Massachusetts, there is an opportunity for the landward migration of tidally influenced coastal wetlands (e.g., salt, brackish, and freshwater wetlands) as sea levels rise.

Paul Erickson

Visitors to Mollie Beattie Bog, Nulhegan Basin Division

Other important factors that affect wetland response to sea level rise are salinity, sediment dynamics, nutrient input, and the habitats and species present. In populated coastal areas, wetland migration is often constrained by land development and shoreline stabilization measures. These conditions can result in the crowding of foraging and bank-nesting birds and the loss of crucial coastal habitat. In addition, the degradation and loss of tidal marshes affect estuarine habitat, production of commercially important fish and shellfish species, and flood attenuation, key ecosystem services for coastal communities. Sea level rise may also result in the inland movement of seawater, shifting the tidal influence zone of streams and rivers upstream and permanently inundating downstream riparian/coastal portions with brackish water. Salinity increases in formerly fresh or brackish surface waters and saltwater intrusion of shallow coastal groundwater aquifers will also result from sea level rise. This may threaten systems such as tidal freshwater forested wetlands that support a variety of wildlife species and critical drinking water sources (NFWPCAP 2014). Research is currently

underway by The Nature Conservancy[1] and the USGS[2] to evaluate how sea level rise is likely to affect this watershed. This and other decision support tools can assist refuge managers in making decisions on how to best address climate change impacts in their geographic area.

Changes in precipitation will primarily impact coastal systems through changes in quantity, timing, intensity, and quality of freshwater flow into estuarine systems. The quantity of freshwater will affect salinity gradients and nutrient inputs, while changes in peak flow timing could affect phenology and migration cues. Changes in the timing and amount of freshwater, nutrient, and sediment delivery will also impact estuarine productivity. For example, changes in flow regimes may affect the abundance and distribution of suspension feeders, such as mussels, clams, and oysters, which could in turn alter food web dynamics as well as water clarity. Increases in flow, turbidity, and eutrophication could also impact submerged aquatic vegetation due to reduced light penetration, as well as organisms that rely on this habitat for food and shelter. These impacts of precipitation changes in estuaries will likely be exacerbated by non-climate stressors such as freshwater demand and extraction, eutrophication, and hypoxia (NFWPCAP 2014).

Increased storm wind strength due to elevated sea surface temperatures could lead to increases in wave height and storm surge and would be magnified by a higher sea level. The primary impacts associated with more intense storm systems include increased flooding and erosion. More intense storms, coupled with common manmade ecosystem alterations such as shoreline stabilization measures that impede or eliminate long-shore transport could lead some salt marshes to fragment and disappear instead of migrating and rebuilding. Shifts in the seasonal distribution of major storm events could also affect plants, wildlife, and fish. More infrequent but intense precipitation events can also lead to scouring of sediment and vegetation during peak flows, redistribution of sediment, resuspension of contaminated sediments, as well as increased pollutants from events such as combined sewer overflows (NFWPCAP 2014).

The gradual temperature increase due to climate change is correlated with increasing nearshore water temperatures. While coastal salt marshes and forested wetlands could experience increased growth due to warmer temperatures, they could also cause expansion of invasive species and disease pathogens. In estuarine environments, increased water temperature will affect water column stratification and eutrophication; and could cause range shifts. Extreme changes may also stress organisms to the point of mortality. In addition, warmer temperatures will exacerbate low summer oxygen levels due to increased oxygen demand and decreased oxygen solubility (NFWPCAP 2014).

The ability of refuge managers to adapt to future climate change will be enhanced by their capacity to alter management regimes relatively rapidly in the face of changing conditions. The lack of fine-scale information about the possible effects of climate changes on locally managed coastal non-forested uplands limits the ability of managers to weigh these risks to their forests against the economic risks of implementing adaptation and/or mitigation treatments. This knowledge gap will impede the implementation of effective management on public or private beaches or rocky shores in the face of climate change (Joyce et al. 2014).

Please see Rationale for guideline “Climate Change Adaptation” under Objective 1.1.

[1] See *www.coastalresilience.org* for project updates.

[2] See *http://woodshole.er.usgs.gov/project-pages/coastal_response/* for updates on the USGS project, Coastal Landscape Response to Sea-Level Rise Assessment for the Northeastern United States.

ENVIRONMENTAL EDUCATION, INTERPRETATION, AND OUTREACH

GOAL 2

Education, Interpretation, and Outreach. Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1 Environmental Education

In collaboration with public and private educators from all four States in the watershed, lead or facilitate the implementation of structured, high quality, natural and cultural resource curricula. The focus will be on guiding educators and students to: develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate high quality environmental education programming throughout the watershed, with priority attention to activities within CPAs and urban areas, include the following (also see "Urban Initiative" discussion in the section "Common to All Alternatives" earlier in this chapter):

- **Environmental Education Planning and Training:** Work with all four watershed State fish and wildlife agency environmental education coordinators, non-profit organizations, and private educational organizations to facilitate and develop high quality, model environmental education curricula, as well as develop highly trained environmental educators to conduct environmental education. Curricula will:

  * Take into account student and teacher needs.

  * Incorporate each state's education standards, national learning standards, and next generation learning standards.

  * Incorporate nationally recognized education initiatives, when appropriate.

  * Be designed with specific goals and objectives.

  * Promote refuge missions.

  * Promote refuge and partner-conserved lands and facilities as environmental education resources.

  We will also work with our partners to improve coordination among educators through the following actions:

  * Host an annual meeting with the four States fish and wildlife agency environmental educators to share respective program priorities and look for opportunities to share resources.

  * Coordinate with existing State and national environmental education programs.

  * Seek ways to support each States outdoor education program and events.

  * Develop and implement high quality professional development for educators, to promote the training of refuge staff and volunteers in the knowledge, skills, and abilities of environmental education.

* Use our volunteers, including Friends members, to enhance environmental education opportunities.

* Identify and engage a diversity of audiences, with an emphasis on urban and non-traditional audiences, but not excluding others within the watershed.

Rationale: See rationale for entire objective below.

- **Environmental Education Delivery:** In collaboration with all four watershed states, other government agencies, non-profit organizations, private educational organizations, staff, volunteers, and members of Friends groups, offer high quality environmental education programs at existing refuge lands and facilities, at partner lands and facilities, and at schools within the watershed. The refuge will seek to:

  * Use the WoW Express and the BAT to deliver high quality, environmental education at schools and at environmental-based camps within the watershed.

  * Formally partner with local schools within the watershed and to conduct environmental education to these audiences multiple times per year.

  * Promote partner lands as outdoor classrooms, and to help deliver priority educational programs.

  * Facilitate the use of refuge and partner lands by educator-led classes, by teachers, and by students.

  * Implement an Adopt-a-Habitat initiative and a traveling mobile environmental education classroom to help individuals learn about and connect with their local environments.

  * Develop an evaluation system to measure the effectiveness of environmental education programs.

  * Continue cooperative relationship with the State of Massachusetts at the Great Falls Discovery Center in Turners Falls, Massachusetts (See appendix A for more detailed information on our proposed environmental education, interpretation, and outreach objectives and strategies at this facility).

Rationale: The Conte Refuge shares its jurisdictional boundaries of the 7.2 million acre Connecticut River watershed with over 2.3 million individuals from urban, suburban, and rural areas. These residents make up a diverse demographic with varying attitudes and interests. Environmental education is a key tool that the refuge can use to reach out to, to partner with, and to share important messages with these residents about wildlife conservation and watershed concerns, and to inspire them to become stewards of their communities; consequently, the Connecticut River watershed. Given ever changing environmental concerns, it will be important to work with partners to develop quality environmental education experiences and to offer different tools and experiences that meet the needs of, and engage various audiences. The importance of environmental education was recognized by the Refuge System when it was identified as one of the six priority public uses legislatively mandated in the 1997 Refuge Improvement Act and further detailed in Refuge System Policy (605 FWS 6). Further, environmental education was identified as an important strategy for the refuge when it was identified within one of the six legislative purposes guiding the establishment of the refuge (1995 FEIS).

The North American Association for Environmental Education states that "environmentally literate" persons know:

- Their daily choices affect the environment.
- How those choices can help or harm the environment.
- What they need to do—individually or as part of a community—to keep the environment healthy and sustain its resources, so that people can enjoy a good quality of life for themselves and their children (*https://naaee.org/about-us/about-ee-and-why-it-matters*; accessed August 2016.)

Through environmental education, interpretation, and outreach, we are striving to help individuals throughout the watershed become environmentally literate, to develop a sense of connection with the environment, and to build a sense of stewardship toward the environment. Our intent is not to direct environmental education priorities or be redundant with the high-quality educational programs offered by the States and non-governmental organizations; rather, we are striving to support those programs, and share new models, or recommend other improvements and efficiencies, as we discover them.

Objective 2.2 Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and facilitate high quality natural and cultural resource interpretation, with priority attention to activities within CPAs and urban areas, include the following:

- **Natural and Cultural Resource Interpretive Planning and Training:** Collaborate with partners to develop high quality interpretive programming, facilities, and other media on and off refuge lands within the watershed that identify and relate natural history and refuge management strategies of the watershed's natural systems. The information will forge emotional and intellectual connections between the interests of the audiences and the habitats and wildlife that exist, and will instill stewardship values. The refuge will also work to develop relationships with constituent cultural groups such as Tribes and historical societies to create programming on cultural and historic resources on the refuge and in surrounding communities. The development of highly trained interpreters will be encouraged by offering interpretive training to permanent and temporary refuge employees, as well as Friends members, partners, and volunteers on a regular basis. A system of monitoring and evaluation will be developed to test interpretive tools for effectiveness.

***Rationale*:** See rationale for entire objective below.

- **Interpretive Program Delivery:** Collaborate with partners to deliver high quality interpretive experiences within the Connecticut River watershed. With partners the refuge will strive to:
  - Provide interpretive opportunities throughout the watershed, on and off refuge lands.
  - Establish partnerships at interpretive facilities (see goal 4 for existing partnerships).
  - Use the WoW Express to deliver interpretive programs throughout the watershed.

* Create interpretive messages to be included in region-wide media.

* Incorporate thematic messages into partners' interpretive programming and other interpretive media.

* Provide programming, signs, publications, and digital media when consistent with public use and management strategies.

* Train refuge staff, Friends, and other volunteers to initiate discussions with visitors and deliver interpretive messages and programs.

* Work with local commercial vendors to offer on-refuge interpretive programs. Vendors would operate under a special use permit and may be charged a fee.

Rationale: The National Association of Interpretation states that interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and the meanings inherent in the resource (*http://www.interpnet.com/nai/About/What_We_Believe/nai/_About/Mission_Vision_and_Core_Values.aspx?hkey=ef5896dc-53e4-4dbb-929e-96d45bdb1cc1*; accessed August 2016). Interpretation is a communication tool used by Federal and State agencies, non-governmental organizations, and the private sector to encourage the public to become better stewards of the environment. Well designed and well communicated interpretive messages have the opportunity to educate individuals, including the 2.3 million residents of the Connecticut River watershed about: watershed concerns; the habitats and wildlife that share the watershed; the refuge, and human connections to the watershed and the environment. Ideally, quality interpretive experiences will take into account the needs of the audience, have relevance to people's lives, and inspire individuals to take an active role in the stewardship of the Connecticut River watershed; and, consequently, the refuge.

The importance of interpretation was recognized by the Refuge System when it was identified as one of the six priority public uses in the 1997 Refuge Improvement Act. The importance of quality interpretation was further recognized by Refuge System Policy (605 FW 7) that addresses interpretation as a management tool with the following direction: "Well-designed interpretive programs can be effective resource management tools. For many visitors, taking part in an interpretive program may be their primary contact with a refuge, the Refuge System, and the Service. It is their chance to find out about refuge resource management objectives and could be their first contact with conservation and wildlife. Through these contacts, we have the opportunity to educate visitors about natural resources, refuges, the Refuge System, and the Service and to influence visitor behavior when visiting units of the Refuge System.

Objective 2.3 Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public and to articulate the importance of local conserved lands, including the refuge, to the watershed. Target audiences include: community members, adjacent landowners, and elected officials in the Connecticut River watershed. Citizens will be empowered to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and conduct effective public and community outreach, with priority attention to activities within CPAs and urban areas, include the following:

- **Local Community Residents and Officials:** Through effective outreach to local community residents and officials, refuge staff will:

  * Work directly with respective Chambers of Commerce, Rotary Clubs, and other civic and non-profit organizations.

  * Keep landowners informed of land management activities on the refuge that may affect neighboring properties through personal contacts, direct mailings appearing on cable TV, writing articles for local newspapers and press releases.

  * Inform and educate community members on refuge regulations and management practices to prevent miscommunication and/or conflict between the refuge and its neighbors. Tools could include newsletters, media andpublic meetings.

  * Disseminate economic benefit information of the refuge to the local community.

  * Support and participate in community celebrations and events.

  * Develop and publicize locally focused events and programs held at the refuge.

  * Support outreach activities of all refuge Friends groups, community groups, and partners.

  * Develop and implement an outreach plan for communicating with landowners to inform and educate them on their role within the watershed and how they can contribute. Plan would include tools and strategies. Possible tools would include landowner workshops, behind the scene tours, special open houses, and publications oriented toward them specifically.

  * Write issue-driven outreach plans to keep elected officials informed of refuge and partner accomplishments and of issues within the watershed that have possible impacts to the refuge.

  * Pro-actively schedule consistent meetings with elected officials to share and update each other on constituent concerns and opportunities.

  * Develop messages and actions that frame refuge units as an asset to the local community. Example benefits that the refuge provides the community include: environmental education and interpretation programming, special events hosted for the community, employment for local youth through YCC, and mutual aid agreements..

  * Learn how to coordinate effectively with partners to spread the Conte message to their membership (e.g., Audubon, TNC, Trust for Public Land).

  * Develop at least 10 Conte Corners well-distributed in the watershed with at least two in each state.

  * Create special programming that will draw local residents and media (e.g., participating in community events and festivals).

  * Implement an Adopt-a-Habitat program to be used in part as an outreach tool for schools and community residents to learn about and become stewards of their local environment.

* Institute regular meetings with community leaders and citizens with the goal of making the refuge more relevant to host communities. These could take the form of an annual meeting in which we present our management plans for the coming year, open houses to welcome the public to see new exhibits or learn about new refuge initiatives, and listening sessions for us to receive community feedback about operations at each of the refuge's divisions.

***Rationale*:** See rationale for entire objective below.

- **National and State Elected Officials:** Through effective outreach to relevant elected officials, refuge staff will meet regularly with local political leaders and officials to inform them of management practices occurring in their districts. Meetings will highlight potential areas of interest, conflict, and other topics of mutual interest.

Rationale: See rationale for entire objective below.

- **Media:** Through effective outreach to media, refuge staff will:

  * Develop a media outreach plan with consistent refuge messages.

  * Communicate often with media outlet representatives to highlight important watershed and refuge specific issues, concerns and opportunities.

  * Develop relationships with media representatives by inviting and hosting reporters at refuge sites on a regular basis. This will assure that correct messages and information appear in media throughout the watershed.

Rationale: See rationale for entire objective below.

- **Greater Watershed Community:** Through effective outreach to the greater watershed community, in an effort to articulate the importance of conserved lands, including the refuge, to the watershed, refuge staff will:

  * Attract visitors on a regional, national and international scale by linking the refuge and the watershed to regional tourism, birding and recreational programs.

  * Encourage citizen participation in activities throughout the watershed.

  * Maintain a well-written and informative web site that provides current information on refuge programs and resources.

  * Create displays promoting the refuge for placement at major regional points of entry such as airports.

  * Use the refuge's mobile exhibits to participate at regional environmentally and recreationally themed shows, conferences and special events.

  * Offer the WoW Express exhibits and an interpreter to partners when feasible. Also, establish partnerships across the watershed to jointly deliver WoW Express interpretive programs.

  * In cooperation with partners, seek to interpret messages with the expansion of the Connecticut River Birding Trail to a Source-to-Sea birding trail.

  * Work with non-traditional venues (e.g., airports, shopping malls, etc.) to install interpretive media appropriate for general audiences.

M. Poole

Fishing education

Rationale: The refuge is unique with its jurisdictional boundaries encompassing the entire watershed. The more than 2.3 million residents of the Connecticut River watershed live in urban, suburban, and rural areas, and comprise a diverse demographic with varying attitudes and interests. When Congressman Silvio O. Conte proposed the creation of the Conte Refuge, he stated his desire was to "…restore and maintain a swimmable, boatable, and fishable Connecticut River for his children and his children's children." This dream is still a primary guiding factor for management at the refuge; yet, the full dream can only be realized through the cooperation and combined effort of watershed residents, Federal, State, and local agencies, non-profit organizations, and other community organizations. Strategic, quality outreach targeted at specific audiences is vital to communicate with individuals about watershed and refuge concerns, to work toward a shared vision for the watershed and to gain support for refuge activities.

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate and land use changes and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Our proposed guidelines and strategies for working cooperatively with others to help meet the objective and support effective scientific and technical outreach, with priority attention to activities within CPAs, include the following:

- **Institutes of Higher Learning:** Collaborate with institutes of higher learning to share knowledge, resources, and research. The refuge will seek to:

  * Develop relationships with institutions of higher learning and other partners conducting relevant conservation research.

  * Keep current on knowledge and experience generated by managers throughout the refuge system, particularly from refuges that are managed primarily for the same trust species as are managed by the Conte Refuge.

  * Promote the SHC framework. Monitor on-the-ground impacts of management practices and amend those practices as necessary.

  * Develop and maintain strong relationships with regional institutions of higher education, and encourage use of refuge lands for environmental research. Take advantage of partners' scientific based resources and engage partner input in the preparation of SHC plans and other resource protection activities.

Rationale: See rationale for entire objective below.

- **Technology and Information Exchange:** Collaborate with technical experts within governmental agencies, conservation organizations, academia, and individuals to facilitate the sharing of knowledge, resources, and research. The refuge will seek to:

  * Host workshops and seminars at rotating strategic locations throughout the Northeast on an annual basis to bring together experts for information and technology transfer on important topics.

  * Participate in professional conferences within the watershed to present information and experience on adaptive management practices to counter the effects on wildlife and habitat of climate change and other environmental challenges.

* If demonstration areas are created on the refuge, ensure lessons learned are shared. Ensure that the refuge outreach materials convey the most current scientific and technical knowledge.

* Work with the NALCC to share scientific information and tools (e.g., spatial data, technical papers, webinars, etc.) with interested landowners, municipalities, organizations, and agencies.

* Assure that technical experts are aware of the refuge's willingness to use refuge lands for research, inventorying and monitoring of natural occurrences, and management effects.

***Rationale*:** See rationale for entire objective below.

- **Mentoring Students:** Collaborate with institutes of higher learning to mentor individuals hoping to enter a natural resource related field. The refuge will:

  * Seek opportunities to work with students at all levels on a regular basis. Examples include student chapters of professional societies, such as The Wildlife Society and the American Fisheries Society.

  * Participate in working with students through other professional associations like the National Association of Interpretation and The National Association of Environmental Educators.

Rationale: One of the six legislative purposes guiding the establishment of the refuge is "to provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access to the extent compatible with other purposes…" Conte Refuge is situated in the "Five College" area of western Massachusetts and is surrounded by approximately 45 universities and colleges in the New England States. The number of nearby local colleges, as well as the abundance of natural and cultural resources in the watershed makes the refuge a key resource for students looking to conduct research projects relating to conservation, wildlife management, resource protection, and human dimensions. Similarly, student research will benefit the refuge by answering management questions, and helping to guide management strategies.

RECREATION

GOAL 3

***Recreation*. Promote high quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages, with emphasis on promoting wildlife-dependent activities that connect people with nature in the outdoors.**

Objective 3.1 Hunting

Support quality public hunting opportunities in the Connecticut River watershed in cooperation with willing landowners to promote a unique understanding and appreciation of natural resources and their management, including the role of the Service and other public lands in resource conservation, while also protecting a traditional outdoor pastime deeply rooted in America's natural and cultural heritage and conservation history.

Our proposed guidelines and strategies for working cooperatively with others to facilitate quality hunting opportunities throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- **Hunting Opportunities, Access, and Infrastructure:** Work with partners and willing landowners to facilitate quality hunting opportunities across ownerships and promote and support investments in hunter access and infrastructure. Quality hunting opportunities will promote resource stewardship, safety, and responsible behavior, and minimize conflicts with other recreationists and neighboring landowners. We will emphasize hunting opportunities that are accessible to a wide array of the American public and provide a reasonable opportunity to experience wildlife.

  We will seek out and promote programs, often in partnership with state fish and wildlife agencies, that encourage diverse opportunities, especially among urban residents, women, and youth. We will consider infrastructure to support the needs of disabled individuals on refuge lands, as well as, the establishment of parking areas and pullouts, and we will maintain formal (i.e., signed and mapped as part of a network) and informal access trails. Through our involvement in the establishment of Connecticut River access sites, we will work to see that consideration is given to waterfowl hunters.

Rationale: See rationale for entire objective below.

- **Hunter Education and Outreach:** Work with partners to promote a knowledgeable hunting public and increase interest in this traditional pastime through support of hunter training, education, and demonstration programs. State fish and wildlife agencies will be among our important partners in accomplishing this work. We will also work with fish and game clubs and individuals interested in providing hunting/outdoorsman-type learning experiences to the general public, both through our staff's participation in training seminars, as well as, hosting such events at our refuge facilities. We will also collaborate with the respective States to promote the use of nontoxic (e.g., lead-free) ammunition to reduce impacts to fish and wildlife. We will also provide refuge visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and hunting brochures. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition. We will also identify the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Rationale: We recognize hunting as a healthy, traditional outdoor pastime, deeply rooted in our American heritage and we will support this activity where it can safely occur on refuge lands and by permission of private landowners. Hunting is one of the six priority wildlife-dependent public uses of the Refuge System as established in the 1997 Refuge Improvement Act. In addition, Presidential Executive Order #113443-Hunting Heritage, "…directs Federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat." Service policy (601 FW 7) establishes procedures for working with state fish and wildlife agency representatives to implement hunting and other programs of interest to both agencies on refuge units. Generally, the guidance is to implement hunt programs that are consistent with respective State hunting regulations. The Refuge System maintains a website with additional information on hunting on refuges, including refuge-specific regulations (*http://www.fws.gov/refuges/hunting/featured_articles.cfm?heid=12*; accessed August 2016)

Hunting opportunities on the refuge can provide wildlife-dependent recreational opportunities which help accomplish population management objectives while promoting visitors' understanding and appreciation for wildlife and their habitats. Prior to allowing hunting on refuge lands, we must determine that the use is compatible. This determination considers public safety and impacts among user groups. The compatibility determination also ensures that refuge hunting programs are biologically sound and support healthy wildlife population levels.

Where found compatible, we will complete all administrative requirements to formally open refuge lands to hunting. Please see appendix D in this final CCP/EIS for our proposed compatible determinations for hunting.

Opportunities for hunting have been in decline due to land use and ownership changes, with more southerly areas in the Connecticut River watershed incurring greater development and northerly areas increasingly posted against hunting. In the face of these declining opportunities, national wildlife refuges can provide important public hunting opportunities and contribute to continuation of a traditional use. On the refuge, hunting is a well-established and valued public use on several divisions. Some of these areas were hunted for decades prior to refuge establishment and visitors continue to come from all over the Northeast to hunt refuge lands.

Under all alternatives, we would continue to work with the states and our partners to educate and inform hunters about the impacts to fish, wildlife, habitats, and human health associated with the use of lead ammunition (See also "Actions Common to All Alternatives: Hunting and Fishing" above). For example, we would continue to distribute materials providing hunters with information on those impacts on fish and wildlife; encourage visitors to use cost-effective, lead-free ammunition; and, describe actions that can be taken to protect wildlife from contamination when lead ammunition are used. In addition, we will work with the States to identify the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands. This would include identifying, quantifying, and evaluating the impacts of lead exposure to wildlife on refuge lands, as well as considering the impacts of lead restrictions on hunters. Any proposed actions or changes to the status quo would be vetted in a public forum, consistent with NEPA and specific to the refuge opening package and the other Service administrative and legislated requirements.

We will continue to work closely with respective state fish and wildlife agencies to ensure the provision of quality public programs, including hunting. The Service defines quality public use as programs that (605 FW 6, 1.6):

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent public uses.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible to people and blend into the natural setting.
- Uses visitor satisfaction to help define and evaluate programs.

Objective 3.2 Fishing

Support quality public fishing opportunities in the Connecticut River watershed in cooperation with willing landowners to promote an understanding and appreciation of natural resources and their management, including the role of the Service and other public lands in resource conservation, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Our proposed guidelines and strategies for working cooperatively with others to facilitate quality fishing opportunities throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- **Fishing Opportunities, Access, and Infrastructure:** Work with partners and willing landowners to facilitate quality fishing opportunities across ownerships and promote and support investments in fishing access and infrastructure. Quality fishing opportunities will promote resource stewardship, safety, and responsible behavior, and minimize conflicts with other recreationists and neighboring landowners. We will emphasize fishing opportunities that are accessible to a wide array of the American public and provide a reasonable opportunity to experience wildlife. We will seek out and promote programs, often in partnership with state fish and wildlife agencies, that encourage diverse opportunities, especially among urban residents, women, and youth. We will consider infrastructure to support the needs of disabled individuals on refuge lands, as well as, the establishment of parking areas and pullouts, and we will maintain formal (i.e., signed and mapped as part of a network) and informal access trails. Through our involvement in the establishment of Connecticut River access sites, we will work to see that consideration is given to anglers.

Steve Hillebrand

Great blue heron

Rationale: See rationale for entire objective below.

- **Angler Education and Outreach:** Work with partners to promote a knowledgeable fishing public and increase interest in this traditional pastime through support of angler training, education, and demonstration programs. State fish and wildlife agencies will be among our most important partners in accomplishing this work, both through demonstration programs and in the development of outreach materials. We will also work with fish and game clubs and individuals interested in providing angling/outdoorsman-type learning experiences to the general public, both through our staff's participation in training seminars, as well as, hosting such events at our refuge facilities. We will also collaborate with the respective States to promote nontoxic (lead-free) tackle and reduce impacts to fish and wildlife.

Rationale: We provide the Refuge System definition of a "quality" recreational program under our rationale for hunting.

Similar to hunting, we recognize fishing as a healthy, traditional outdoor pastime, deeply rooted in our American heritage and support this activity where it can safely occur on refuge lands and other lands when permitted by landowners. Fishing is also viewed as an initial means of engaging and connecting people, particularly children, in outdoor pursuits. Access to fishing is often a challenge due to private ownerships; thus we actively promote public opportunities for this recreational activity on refuge lands. Fishing is one of the six priority wildlife-dependent public uses of the Refuge System as outlined in the 1997 Refuge Improvement Act. The Refuge System maintains a Web site with additional information on fishing on refuges, including refuge-specific regulations *(http://www.fws.gov/refuges/fishingguide/*; accessed August 2016).

Opportunities for fishing have been in decline due to lack of access and competition for space with other recreational uses. Because of this, allowing fishing on the refuge can provide and protect important opportunities. Fishing is a well-established and valued public use on several refuge divisions. Fishing occurred in some of these areas for decades prior to refuge establishment, some of which are especially prized for trout fishing.

Fishing opportunities on the refuge can provide wildlife-dependent recreational opportunities which help accomplish population management objectives while promoting visitors' understanding and appreciation for wildlife and their habitats. Prior to allowing fishing on refuge lands, we must determine that the use is compatible. This determination considers public safety and impacts among user groups. The compatibility determination also ensures that refuge fishing programs are biologically sound and support healthy wildlife population levels. Where found compatible, we will complete all administrative requirements to formally open refuge lands to fishing. Please see appendix D in this final CCP/EIS for our proposed compatible determinations for fishing.

Under all alternatives, we would continue to work with the states and our partners to educate and inform anglers about the impacts to fish, wildlife, habitats, and human health associated with the use of lead tackle (See also "Actions Common to All Alternatives: Hunting and Fishing" above).

We will continue to work closely with respective state fish and wildlife agencies to ensure the provision of quality public fishing opportunities.

Objective 3.3 Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in a variety of natural habitats in the Connecticut River watershed in order to connect a broad spectrum of people with nature.

Our proposed guidelines and strategies for working cooperatively with others to facilitate quality opportunities for wildlife observation and photography throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- **Wildlife Observation and Photography Opportunities, Access, and Infrastructure:** Work with partners to encourage these activities through the provision of parking areas, trails, and observation blinds necessary to facilitate access and enhance opportunities for wildlife viewing and photography. Quality wildlife observation and photography opportunities will promote resource stewardship and a conservation ethic. We will emphasize wildlife observation and photography opportunities that are accessible to a wide array of the American public and provide a reasonable opportunity to experience wildlife, such as migratory songbirds in breeding plumage, and resident, charismatic species, such as white-tailed deer and moose.

Rationale: See rationale for entire objective below.

- **Aids to Support Wildlife Observation and Photography on Refuge Lands:** Work with partners to develop and promote both traditional resources, such as paper maps and brochures, as well as, emerging technologies, like phone applications and QR codes (Quick Response codes used with a cell phone to learn about a site), as information sources related to wildlife observation and photography.

Rationale: See rationale for entire objective below.

- **Watershed-based Initiatives to Support Wildlife Observation and Photography:** Work with partners and willing landowners to develop and promote watershed-wide viewing opportunities, such as the Connecticut River Birding Trail, Connecticut River Byway, and the Adopt-a-Habitat Initiative, which helps landowners, organization, and schools adopt an area and restore and manage its as habitat for wildlife and for wildlife viewing.

Rationale: We provide the Refuge System definition of a "quality" recreational program under our rationale for hunting. Wildlife observation and photography are an important way to connect people to the outdoors and nature–and a means to help people recognize their own role in the environment. We actively promote public opportunities for this recreational activity on refuge lands. Wildlife observation and photography are two of the six priority wildlife-dependent public uses of the Refuge System as outlined in the 1997 Refuge Improvement Act. The Youth in the Great Outdoors Secretarial Initiative promotes programs that connect people with nature *(http://www.fws.gov/northeast/cpwn/*; accessed August 2016).

While more opportunities exist for wildlife observation and photography, than perhaps hunting and fishing, the challenge is instead to make these uses more accessible to a changing demographic (i.e., increasingly urban, diverse, and minority audiences). These audiences may possess a different relationship to nature than the traditional, and often more rural, refuge audience–and yet, it is equally important to engage all potential users. Wildlife observation and photography is a valued public use on certain refuge divisions, especially those within particularly scenic landscapes and containing a good public road/trail network.

As desired by the respective state fish and wildlife agencies, we will partner with them to promote the provision of quality, public programs that enhance opportunities for wildlife observation and photography.

Objective 3.4 Other Recreational Activities

Support compatible, non-priority, outdoor recreational opportunities and public access that provide quality, nature-based experiences throughout the Connecticut River watershed to facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Our proposed guidelines and strategies for working cooperatively with others to facilitate other appropriate and compatible outdoor recreational opportunities throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- **Regional Water-based Trail Initiatives and Opportunities:** Work with partners and willing landowners to support compatible, water-based trail initiatives within the Connecticut River watershed that promote a conservation/land ethic and quality outdoor experiences for people of all abilities. As opportunities arise, work with partners to establish a series of campsites and launches to ensure a fully functioning Connecticut River Paddlers' Trail throughout the full 410-mile length of the Connecticut River. Use our website and other outreach efforts to promote the Paddlers' Trail and Northern Forest Canoe Trail.

Rationale: See rationale for entire objective below.

- **Regional Land-based Trail initiatives and Opportunities:** Work with partners and willing landowners to support compatible, land-based trail initiatives within the Connecticut River watershed that promote a conservation/land ethic and quality outdoor experiences for people of all abilities. When appropriate and compatible, use refuge lands to provide linkages for existing, established regional or statewide trails. Where refuge ownership interests coincide with regional hiking trails, such as the Appalachian National Scenic Trail and New England National Scenic Trail; assist in the long-term protection of their continuity and quality by working with existing or prospective conservation owners to maintain trail and habitat connectivity. Deploy outreach methods to engage users of other land-based trails, such as equestrian, rail trail, cycling, and snowmobile trails in the mission of the refuge system, when they occur adjacent to refuge lands and support a conservation ethic.

Rationale: See rationale for entire objective below.

- **Unit-specific Land-based Trail Initiatives and Opportunities:** Work with partners to support land-based trail initiatives within or adjacent to refuge units to promote outdoor, nature-based activities, and strive to instill a conservation and land ethic. When appropriate and compatible, allow access across refuge lands to maintain, and provide new linkages for, existing established trails open to the public. In general, users would already have a nearby and logical connection to refuge lands and refuge lands would constitute a minority of the trail network's length (e.g., for example, less than 25 percent). The trail, and its associated use, would not be allowed if it is exclusive to anyone, or any club or organization. Site-specific compatibility determinations will be required in response to a request for any such trail segments.

Rationale: Although many people participate in the wildlife-dependent activities described above, we recognize that a large and diverse array of outdoor recreational trail pursuits occurs within the Connecticut River watershed and that many of these activities do not necessarily fit our definition of priority, wildlife-dependent recreational uses, such as hunting, fishing, and bird watching. Examples of trail activities we are aware of on nearby lands include equestrian riding, snowmobiling, cross-country skiing, and sled dog mushing. Nonetheless, engaging these users where it can be done within our compatibility standards represents an opportunity to build a connection with a new constituency–and a means to help people recognize their own role in the environment. In addition, we are pleased to be able to provide public opportunities for varied recreational activities on refuge lands.

As desired by various user groups and organizations, we will collaborate with them to promote the provision of such quality, public programs that enhance connections and develop a rapport with a new demographic. For example, we would cooperate with others to implement the recommendations in the Connecticut River Recreation Management Plan, to the extent practical.

As we support trail development and protection on either refuge or private lands, we will encourage managing for "soft" edges along a trail corridor to benefit both visitors and wildlife. Soft edges are those where the trail corridor perimeter is not an abrupt, straight-line vegetation change, but is one where the corridor has vegetation edges that are more gradual or undulating (e.g. soft). Soft edges are more aesthetically appealing, but they also buffer against disturbances better than those with straight and abrupt (hard) edges. This concept is most important

in providing a transition between urban or agricultural land uses and natural areas. Soft edges especially help minimize the diverse disparities between urban and natural areas, such as the difference between highly lit (at night) and louder urban areas and the low-light, more quiet natural areas.

PARTNERSHIPS

GOAL 4

***Partnerships*. Enhance the conservation, protection, and stewardship of natural and cultural resources, and promote wildlife-dependent recreation, throughout the Connecticut River watershed by initiating, supporting, and promoting partnerships with other Federal, State, and local agencies, Tribal governments, and private organizations.**

Objective 4.1 Strategic Habitat Conservation Partnerships

Create, enhance, and facilitate partnerships to plan, design, deliver, and evaluate SHC in the Connecticut River watershed, such as the *Connect the Connecticut* Landscape Conservation Design (LCD), with an emphasis on promoting action in CPAs. Special effort will be made to coordinate with the NALCC partnership, the four State fish and wildlife agencies, the *Connect the Connecticut* LCD partnership, and other partners advancing conservation in the watershed.

Our proposed guidelines and strategies for working cooperatively with others to facilitate strategic habitat conservation throughout the watershed, with priority attention to CPAs, include the following:

- ***Habitat Restoration and Management*:** Work with partners and willing landowners to restore, manage, and enhance habitat values for Federal trust resources and other species of conservation concern. Identify, with other Federal and State partners, programs and funding sources for projects and the availability of technical assistance regarding project feasibility and design. Service project priorities would include riparian and floodplain habitat restoration along the mainstem Connecticut River and its tributaries, reestablishing aquatic connections for migratory fish and other aquatic species (e.g., aquatic species barrier removal), restoring wetland functions and values, protecting federally listed and other Federal trust species, and treating invasive species that threaten important habitats for those species.

Many Federal, state, and regional and local partners, such as regional conservation partnerships, local land trusts, and regional and local watershed committees, are already actively engaged in restoration and management activities. We would continue to support those planning and implementation endeavors, both on and off refuge lands. Our intent would be to complement the great work already established by those partners. Refuge staff could also facilitate the sharing of ecological, GIS, and other information and technical resources, support fieldwork, and provide assistance in grant writing to support priority projects.

Coordination among Federal and state agencies will be particularly important to address major hydrologic and aquatic issues in the river. We will support the Service's Connecticut River Coordinator's Office in pursuing discussions with the USACE and other partners to identify opportunities to manage water resources (e.g., flood risk reduction infrastructure) in order to promote the structure, function, and flows (e.g. velocity and duration) of water resources in the watershed in a manner that is more natural. CRASC Commissioners and the Technical Committee, who have recognized for decades the importance of working on a landscape scale, will continue to be important partners in addressing aquatic passage issues and in implementing restoration projects across the watershed.

Generally, we would work with our Federal, state, regional and local partners to:

- Review and, as warranted, assist in the implementation of quality plans already in place consistent and compatible with refuge goals.
- Prioritize habitat conservation needs for Federal trust resources and other species of conservation concern, including prioritizing opportunities for restoration and management.
- Develop specific management and implementation strategies for those priorities, and identify and address limiting factors.
- Implement management strategies through existing and new partnerships.
- Develop and implement evaluation measures for management strategies as needed; and adapt management in response to what is learned through monitoring.

Rationale: See rationale for entire objective below.

- ***Private Lands Program Coordination*:** Use the Service's Partners for Fish and Wildlife Program (Private Lands program) to facilitate private landowner assistance among all four States, Federal agencies, and conservation organizations who are working with private landowners to protect and manage valuable fish and wildlife habitats. This program is guided by four objectives:
  - Promote and implement habitat improvement projects that benefit Federal trust species.
  - Provide conservation leadership and promote partnerships.
  - Encourage public understanding and participation
  - Work with the USDA to implement conservation programs.

This program details priority actions in regional strategic action plans. An updated plan for the Service's Northeast Region for years 2017-2021 is currently in development. Proposed program emphases include improving and restoring degraded wetlands and riparian habitat, improving and restoring aquatic connectivity, and improving and managing young forest and pollinator habitat.

We believe this Service program should complement partners' programs, implement the *Connect the Connecticut* LCD, and support the purposes of the refuge by:

- Working with landowners to identify specific habitat improvement opportunities.
- Assisting landowners in finding and preparing grants or other funding and cost-sharing opportunities, sponsored by State and Federal agencies or private organizations, to accomplish conservation work. In particular, connect these landowners with Federal programs and funding.
- Assisting landowners with their grant submissions.
- Sharing scientific knowledge and best management practices for designing and implementing projects.

Nulhegan Basin Division wildlife festival

USFWS

- Where appropriate and practical, implementing cooperative management agreements on private lands around refuge units and divisions to support work consistent with refuge purposes.

- Where it helps meet mutual goals, cooperating with local communities on projects such as trail work, access improvements, and drainage and water control structures.

The Private Lands program is our most effective way to outreach and create partnerships with private landowners to achieve shared regional habitat and wildlife conservation goals. Currently, the refuge staff includes one full-time employee who helps administer the Private Lands program serving as a permanent presence in the watershed–bringing people together, getting the right people talking to each other, helping partners prepare grants and other funding documents, and complementing Federal and State programs with similar aims. We will work with other organizations with land management expertise in developing and implementing the program.

Rationale: See rationale for entire objective below.

- ***Land Protection*:** Advance conservation in the Connecticut River watershed through a strategic, public-private land protection program. Our proposed land conservation goal is to assemble a well-distributed conserved lands network in the watershed that contributes to sustaining ecological function, supports healthy populations of native fish and wildlife, especially those of conservation concern, is respectful of the working landscape, and anticipates the effects of climate and land use changes. This is primarily represented by the core areas and connectors in the *Connect the Connecticut* LCD. We have identified a network of lands (e.g., CPAs and CFAs), supported by the LCD, that we believe have high ecological and Federal trust conservation value that will be priority areas for us to work with partners to protect. However, that focus would not exclude the very important conservation work of our partners being done elsewhere. Rather, we believe these are complementary actions. The focus of our refuge land protection design is to protect high Federal trust value habitats, promote connectivity in aspect, substrate, and process, and to insure

representation and redundancy of ecosystems in order to sustain resiliency in natural systems in light of predicted climate and land use change.

We propose that the Service would take a lead, but not exclusive role in land conservation within CFAs. We would also work in cooperation with partners on their initiatives in both CFAs and CPAs, and facilitate as practical and appropriate, other conservation projects led by others elsewhere in the watershed consistent with refuge goals and objectives. Refuge support could include the sharing of ecological data, grant writing, and technical field support, as needed and appropriate, to encourage land protection activities by partners within the CPAs.

Refuge staff would work in close cooperation with Federal and State agencies, land trusts, and other conservation partners, to foster a climate of cooperation and shared goals when pursuing land protection. In particular, we would ensure close coordination with State agencies by holding regular land acquisition coordination meetings to keep mutual agency interests moving forward and to avoid duplicative efforts. Refuge staff would facilitate a Federal acquisition process that is as efficient and responsive as possible.

Appendix C in this final CCP/EIS represents the Service's proposed refuge acquisition plan. Refuge staff would also share ecological and other GIS data, support grant writing, provide technical field support, as needed and appropriate, to encourage land protection activities by partners.

As we have emphasized, we only acquire land from willing sellers. Also, we do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances.

Rationale: The 1991 Conte Refuge Act legislatively mandated a refuge be established in the Connecticut River watershed for six different purposes related to conservation; the purposes include conservation for specific species, as well as ecosystems, natural diversity, wetlands protection, and a charge to support scientific research, environmental education, and wildlife-dependent recreational access. Supporting language for the legislation included the recognition that partnerships among the Service, other Federal agencies, State agencies, and the conservation community would be critical to fulfilling these purposes.

In particular, the Service would like to facilitate the leveraging of the various Federal agency's funds and grants, to State and private conservation partners, working in the watershed to implement the *Connect the Connecticut LCD* conservation ppriorities. Objective 4.11 discusses this in some detail. A recent acknowledgement of Federal agencies collaborating to achieve conservation is established in the Service's Directors Order 217, dated August 9, 2016. This order ensures that Service personnel place a priority on working with the USDA/ NRCS to promote voluntary conservation actions by nonFederal landowners and managers through Working Lands for Wildlife (WLFW) and other wildlife conservation-focused programs. The goal is to leverage conservation on private lands through WLFW and other wildlife conservation-focused programs in collaboration with NRCS that support the Service's mission, with a particular focus on conserving listed, candidate, and other at-risk species (at-risk species).

All four watershed States, the Forest Service, land trusts, and conservation organizations have identified lands of high conservation value, and most have identified specific priority areas for protection respective to their agency's mission. Collectively, they collaborated on priorities in the *Connect the Connecticut* LCD. There is already a valuable exchange of resource information among the States, Federal agencies, and organizations that helps this process

and continues to help each partner update and refine their priorities. In addition, when identified lands become available from willing sellers, there is often communication among partners to assess who is best suited and has available resources to acquire the property. Maintaining this networking is critical for meeting land conservation and collaboration goals over the long term in the watershed.

We will continue to work closely with the NALCC partnership, the States, and other stakeholders to implement the *Connect the Connecticut* LCD over the long term. We will also work with the NALCC partnership and other stakeholders to consider conservation priorities identified in the initiative currently named "Regional Conservation Opportunity Areas" (RCOAs). This effort, scheduled for public release in 2017, builds upon *Connect the Connecticut* and expands the work across the entire Northeast region. Updated science and information exhanges provided by partners will help inform and prioritize our future biological planning within the watershed, and help direct assumption-driven research and monitoring necessary to shape decisions about conservation delivery within an adaptive management framework. Through this coordination, refuge management can be adapted in a timely manner as new information arises. Furthermore, working together with conservation partners, the refuge could serve as a demonstration area for implementing projects, or testing models and tools, that are developed.

Objective 4.2 Terrestrial Species Protection, Restoration, and Management Partnerships

Create, enhance, and facilitate partnerships to protect, restore, and manage populations of terrestrial species of conservation concern, including federally listed species, species proposed for listing, and migratory birds, throughout the Connecticut River watershed, with an emphasis on promoting action in CPAs.

Our proposed guidelines and strategies for working cooperatively with others to conserve species populations throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- ***Federally Listed Terrestrial Species Conservation***: Support the protection of federally listed and candidate species in the watershed, and minimize the listing of new species, by collaborating with Federal and State agencies, local towns, non-governmental organizations, and willing landowners. Work in partnership to develop and implement species recovery plans, spotlight action plans, species conservation strategies and targets, habitat conservation plans, State wildlife action plans, and other conservation measures with a goal to avoid new species listings. Those measures may include land protection, public use and access management, and invasive species control. Work closely with other Service programs to mobilize agency resources toward coordinated conservation work in the watershed with priority given to the following federally listed, candidate, and proposed species:

  * Puritan tiger beetle (federally threatened)
    - Recovery Plan 1993-*http://www.fws.gov/chesapeakebay/endsppweb/beetle/PDFs/1993RecoveryPlan.pdf* (accessed August 2016).

  * Jesup's milk-vetch (federally endangered)
    - Spotlight Species Action Plan 2009- *https://www.fws.gov/northeast/Endangered/pdf/Jessup's%20milk-vetch%20SSAP.pdf* (accessed August 2016).

  * Northeastern bulrush (federally endangered)
    - Recovery Plan 1993– *http://www.fws.gov/northeast/pafo/pdf/NB_Recovery_Plan.pdf* (accessed August 2016).

* Canada lynx (federally threatened)
  - Recovery Outline 2005– *http://ecos.fws.gov/docs/recovery_plan/final%20draft%20Lynx%20Recovery%20Outline%209-05.pdf* (accessed August 2016).

* Piping plover (federally threatened)
  - Revised Recovery Plan 1996– *http://www.fws.gov/northeast/pipingplover/pdf/entire_plan.pdf* (accessed August 2016).

* Small whorled pogonia (federally threatened)
  - Recovery Plan 1992– *http://ecos.fws.gov/docs/recovery_plans/1992/921113b.pdf* (accessed August 2016).

* Red knot *rufa* subspecies (federally threatened)
  - Spotlight Species Action Plan 2010– *https://www.fws.gov/northeast/endangered/PDF/red_knot_action_plan.pdf* (accessed August 2016).

* Northern long-eared bat (federally threatened)
  - Northern long-eared bat interim conference and planning guidance– January 2014 *https://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf* (accessed August 2016).

* Roseate tern (federally endangered)
  - Roseate Tern Northeastern Population Recover Plan – 1998 *https://www.fws.gov/ecos/ajax/docs/recovery_plan/981105.pdf* (accessed November 2016).

* Indiana bat (federally endangered)
  - Indiana Bat Five-Year Review Summary and Evaluation - 2009 *https://ecos.fws.gov/docs/five_year_review/doc2627.pdf* (accessed November 2016).

* Northern bog turtle (federally threatened)
  - Bog Turtle Northern Population Recovery Plan – 2001 *http://ecos.fws.gov/docs/recovery_plan/010515.pdf* (accessed November 2016).

* Cobblestone tiger beetle (species under review)
  - *https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=8134* (accessed November 2016).

* Monarch butterfly (species under review)
  - *https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=9743* (accessed November 201).

* Yellow-banded bumble bee (species under review)
  - *https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=10403* (accessed November 2016).

* Wood turtle (species under review)
  - *https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6997* (accessed November 2016).

Rationale: See rationale for entire objective below.

- ***Migratory Bird Conservation***: Work with partners to plan, develop, and implement ecoregional migratory bird conservation programs to ensure the long term ecological sustainability of migratory birds and their habitat, and to increase awareness of the value of migratory birds and their habitats for their intrinsic, ecological, recreational, and economic significance within the watershed.

Support migratory bird ecoregional plans and priorities developed through the NALCC for migratory birds, through actions such as:

* Population monitoring, assessment, and management.
* Habitat restoration, management, and protection.
* Private lands coordination and grants writing and funding support.
* Communications and outreach.
* Recreational opportunities.

Rationale: See rationale for entire objective below.

- ***Other Terrestrial Species of Conservation Concern Identified by the Service, NALCC Partnership, or States*:** Work with partners to plan, develop, and implement other species' ecoregional conservation programs to ensure the long term ecological sustainability of species of conservation concern and their habitat, and to increase awareness of the value of those species and their habitats for their intrinsic, ecological, recreational, and economic significance.

Rationale: Partnerships and collaborations are essential to successful conservation of all species, particularly those that migrate or have large home ranges. No one partner has all the lands and resources necessary to meet a migratory species' goal. There are numerous species and habitat-focused regionally based partnerships comprising Federal and State government agencies, non-profit organizations, corporations, Tribal governments, and individuals who work to implement conservation plans in the watershed. For example, we are actively engaged in a New England cottontail conservation partnership. The science provided by the NALCC and other conservation partners will help inform existing ecoregional conservation plans and other strategic plans developed for conservation lands in the watershed, including the refuge. We indicate above some of the federally listed species plans (e.g., recovery plans), which will guide our management actions to benefit these species. Existing bird plans developed by the Service and partners include the BCR 14 and 30 plans, the North American Waterfowl Plan, the Waterbirds for the Americas Plan, the U.S. Shorebird Plan, PIF plans, and the Black Duck Joint Venture. We will also work with the four States to coordinate State WAP, especially with actions that support conservation of Federal trust resources.

We will continue to support and help implement the *Connect the Connecticut* LCD, initiated by the NALCC. As noted previously, this project is a collaborative effort among 30 partners, including the Service, to develop and implement a strategic plan for the watershed that will sustain habitat for fish, wildlife, and plants within a working landscape. It is intended to guide collective conservation actions within the watershed and connect to broader regional conservation goals for conserving sustainable fish and wildlife populations and their habitat for people within a working landscape. Science-based tools were developed that will serve to facilitate a conservation design for other geographies in the entire Northeast Region (*http://connecttheconnecticut.org/;* accessed October 2016).

Objective 4.3 Aquatic Species Protection, Restoration, and Management Partnerships

Support the conservation of migratory fish and other aquatic species of conservation concern by collaborating with Federal and State agencies, local towns, and non-governmental organizations in the implementation of fish and other aquatic species conservation plans.

Our proposed guidelines and strategies for working cooperatively with others to conserve fish and other aquatic species populations throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- ***Federally Listed Aquatic Species Conservation***: Support the protection of federally listed and candidate species in the watershed, and minimize the listing of new species, by collaborating with Federal and State agencies, local towns, non-governmental organizations, and willing landowners. Work in partnership to develop and implement species recovery plans, species conservation strategies, habitat conservation plans, State wildlife action plans, and other conservation measures with a goal to avoid new species listings. Those measures may include land protection, public use and access management, and invasive species control. Work closely with other Service programs to mobilize agency resources toward coordinated conservation work in the watershed with priority given to implementing the following plans:

  * Recovery Plan (1993) for the dwarf wedgemussel— *http://www.fws.gov/northeast/nyfo/es/dwm.pdf* (accessed August 2016).

  * Recovery Plan (1998) for the shortnose sturgeon— *http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf* (accessed August 2016); and *http://www.fws.gov/r5crc/shortnose_sturgeon_program.htm* (accessed August 2016)

  * The Service's Region 5 Strategic Fisheries Plan for the Connecticut River watershed (Service 2009)— *https://www.fws.gov/northeast/fisheries/pdf/FAC_StrategyPlan_2016_2020.pdf* (accessed August 2016).

  * Atlantic States Marine Fisheries Commission numerous species plans— *http://www.asmfc.org/fisheries-management/program-overview* (accessed August 2016) Connecticut River Atlantic Salmon Commission priorities– *http://www.fws.gov/r5crc/who/crasc.html* (accessed August 2016)

  * The Nature Conservancy and Northeast Association of Fish and Wildlife Agency's Northeast Aquatic Connectivity, An Assessment of Dams on Northeastern Rivers (TNC 2011)— *http://cw-environment.usace.army.mil/restore/fishpassage/pdfs/NEAquaticConnectivity_Report.pdf* (accessed August 2016).

  Support the CRASC's diadromous fish restoration efforts, the Service's Connecticut River Coordinator's Program, State fish and wildlife and transportation agencies, NOAA Fisheries, TNA, TU, and other stakeholders in identifying, assessing, and removing fish and other aquatic species passage barriers, and restoring streams to natural channel designs where possible. Where barrier removal is not feasible, support efforts to design an appropriate fish passage facility. Promote the use of clear ecological criteria to prioritize work (e.g., amount and quality of habitat upstream of barrier, size, and status of affected populations) among partners. These prioritizations could apply to a single species, but would be most useful when all species of concern are evaluated together.

Rationale: See rationale for entire objective below.

- ***Other Aquatic Species of Conservation Concern Identified by the Service, the NALCC Partnership, or States*:** We will work with Service programs, Atlantic States Marine Fisheries Commission, Connecticut River Atlantic Salmon Commission, other Federal agencies, and State agencies to advance conservation of other aquatic Federal trust species, NALCC aquatic representative species, or State aquatic species of greatest conservation need. Information on species of concern and associated management plans can be accessed at:

- American shad (*http://www.fws.gov/r5crc/american_shad_program.htm;* accessed August 2016)
- River herring (*http://www.fws.gov/r5crc/river_herring_program.htm;* accessed August 2016)
- American eel (*http://www.fws.gov/r5crc/american_eel_program.htm*; August 2016)
- Eastern brook trout (*http://easternbrooktrout.org/*; accessed August 2016)
- Sea lamprey (*http://www.fws.gov/r5crc/sea_lamprey_program.htm*; accessed August 2016)
- Striped bass (*http://www.fws.gov/r5crc/striped_bass_program.htm*; accessed August 2016)

We will also consult the numerous species plans developed by the Atlantic States Marine Fisheries Commission which can be reviewed at *http://www.asmfc.org/fisheries-management/program-overview* (accessed August 2016)

Promote the conservation measures on fish passage that are noted above for federally listed species. Work with States, NOAA Fisheries, TNC, and other partners to identify and prioritize these and other conservation actions, actively seek funding, and implement on-the-ground projects and monitoring with the goal to restore and maintain these native species to their historic range in the watershed.

Rationale: The Connecticut River and its tributaries provide important habitat for a wide range of aquatic species, including Federal trust resources, such as migratory fish and federally listed species. The refuge will continue to work with partners, including the Service's Connecticut River Coordinator's Office, to help protect and restore aquatic habitats for these species. In particular, we will work with partners to address threats to aquatic species, such as removing barriers to aquatic species passage.

Objective 4.4 Invasive Species Management Partnerships

Plan and implement coordinated and strategic actions among conservation partners and private landowners to reduce the ecological threat from invasive exotic plants and wildlife species in the Connecticut River watershed. Work with those partners to design and implement strategies for controlling the spread of established invaders, preventing new invasions, and in the early detection and rapid response to control new invaders.

Our proposed guidelines and strategies for working cooperatively with others to facilitate invasive species management throughout the Connecticut River watershed, with priority attention to CPAs, include the following:

- ***Cooperative Invasive Species Management Areas and Other Invasive Species Partnerships*:** Work with the Friends of Conte Science and Stewardship Committee to develop an organizational framework or network that would incorporate the invasive species control program into priority stewardship activities at all levels within the watershed, including watershed-wide, in subwatersheds, and at local levels. The goal is to create an organization that is well-integrated with other conservation partnerships and would result in on-the-ground invasive species inventories, monitoring, education, and management activities in priority habitats. Specifically, we would:
  - Take a leadership role in formalizing and continuing the work undertaken from 2012-2013 to set up a watershed-wide invasive species management partnership using the CISMA model partnerships. The pilot group

formed under this grant goes by the name "Connecticut River Watershed Invasive Species Partnership." To continue its work, this watershed-wide CISMA would function as a subgroup of the Friends of Conte Science and Stewardship Committee and coordinate closely with other stewardship activities deemed important by the group. This organization would also network existing invasive species partnerships and take recommended next-steps from the 2014 report "Identifying Priority Areas for Invasive Plant Management in the Connecticut River Watershed" written by the Strategic Planning Subcommittee of the Connecticut River Watershed Invasive Species Partnership. This report gives guidance in identifying the most important areas to undertake invasive species work, including the establishment of subwatershed CISMAs and/or partnerships at the local level. If Federal funding for CISMAs becomes available, the group could apply for funds to coordinate the umbrella CISMA and, using our legislative authority to administer a small grants program, distribute funds to the smaller groups for projects meeting umbrella group objectives.

* Work with existing partnerships, including the six CISMAs and other local watershed associations, to continue to identify priorities, and develop invasive species management objectives and strategies that support local efforts while fulfilling watershed-wide objectives; ensure that the partnership considers all taxa of invasive species, in addition to plants.

* Help develop invasive species partnerships in CPAs where none currently exist, with priority given to those CPAs falling within priority areas identified in the report specified above and additional analyses stemming from that report.

Rationale: See rationale for entire objective below.

- ***Invasive Species Outreach***: Provide target audiences and concerned citizens with the information they need to take meaningful actions to control or prevent species spread on their own lands or through their recreational and/or professional activities. Specifically we will:

  * Inform the public about the importance of each person doing their part and supply them with the information to take wise action.

  * Provide targeted outreach to public agencies that may have a role in the spread of invasive plants through their management actions, such as highway maintenance departments.

  * Prioritize actions by considering which species are of highest threat to biodiversity, are threatening rare species, or can most successfully be eradicated; as well as which areas are especially important to restore due to important natural resources; educate partners and public about these priorities.

  * Help groups successfully plan and implement volunteer control days in their communities for plants that are easy to control by hand such as garlic mustard.

  * Develop a list of volunteer opportunities at Refuge treatment areas, CISMAs, or adopted habitats.

Rationale: See rationale for entire objective below.

- ***Early Detection and Rapid Response Control*:** Work with partners to design and implement strategies for prevention, early detection, and rapid control response to new invaders, especially those deemed to pose a serious threat to native species populations or biodiversity. Specifically we will:

  * Seek a seat on the Northeast Aquatic Nuisance Species Panel or regularly attend meetings, becoming active in its work to advance prevention, early detection and rapid response within the Northeast.

  * Work with the State invasive species groups to develop lists of the species that would pose serious threats to biodiversity if they enter the watershed and develop a protocol for early detection and rapid response. Focus first on priority species already known to be in New England such as zebra mussel, Asian longhorn beetle, monk parakeet, hemlock wooly adelgid, emerald ash borer, mute swan, hydrilla, mile-a-minute vine, and Japanese stiltgrass.

  * Continue water chestnut spread control actions by assisting to find funds for large populations, leading groups to hand-pull smaller populations, and inspecting other water bodies for this species. Locate groups willing to "adopt a water body for water chestnut control" to further the refuge's efforts.

Rationale: See rationale for entire objective below.

- ***Invasive Species Inventories and Mapping***: Work with partners to ensure that inventory results are documented and shared in a timely manner, and to coordinate inventory efforts where possible.

  * Research how much of the watershed is covered in the EDDMapS/ IPANE (Early Detection and Distribution Mapping System/Invasive Plant Atlas of New England) inventory project and what gaps exist, especially on refuge and other conservation lands.

  * Work with partners and volunteers to fill the gaps of the IPANE data within the watershed, (with a special focus on the CPAs and refuge-owned lands) and institute a procedure for the refuge to be notified if any invaders new to the area are discovered.

  * Work with EDDMapS staff to include existing refuge data on invasive plants into the EDDMapS/IPANE database.

Rationale: Addressing invasive plants has been a Service priority since refuge establishment. Much of the refuge's cost share grant program focused on funding invasive plant control projects. The refuge has one full time staff person dedicated to working with partners to control invasive species on both refuge lands and other ownerships in the watershed. We discussed many of the accomplishments of the program in chapter 3. This objective would build off of the existing program to include control work on other high priority invasive species problems within the watershed, including forest pests, aquatic organisms, and problematic wildlife species.

Objective 4.5 Special Designation Areas Partnerships

Support existing Federal and State designated special areas, and work with partners and willing landowners to promote additional designations that enhance the protection and/or recognition of natural, cultural, and recreational resources of significance within CPAs.

Our proposed guidelines and strategies for working cooperatively with others to promote special designations that benefit natural, cultural, and recreational

resources of concern throughout the watershed, with priority attention to CPAs, include the following:

- **Eligibility:** Work with partners to share information with willing landowners on eligibility requirements for, and the benefits of, special designation areas.

- **Monitoring:** Work with partners and willing landowners to establish a monitoring program, or implement ones already developed, and pool resources to accomplish that monitoring, in an effort to ensure that the special designation areas maintain their characteristics.

Rationale: Special designation areas in the watershed include, but are not limited to: Research Natural Area; Federal and State Wild and Scenic River; American Heritage River; National Recreation Trail (land and water trails); National Scenic Trail (land and water trails); National Historic Trail; National Natural Landmark; National Historic Landmark, Site, or Monument; National Register of Historic Places site; National Wilderness Preservation System Area; Important Bird Area; National Blueway; Scenic Byway; and Ramsar Wetlands of International Importance.

USFWS

Barred owl at festival

Each of these designations has distinctive criteria for qualifying, and many have specific guidelines for their maintenance and management. Some are designated by Congress or State legislatures and thereby supported by laws and regulations, while others are identified by conservation organizations or individuals and are voluntary programs. Establishing these areas promotes their uniqueness, and for those that are regulated, ensures their protection under law. In addition, a special designation can provide an advantage when seeking grants or other special funding opportunities for management and maintenance.

We would continue to work with partners to protect existing special designation areas and the characteristics that make them unique. Important to that effort will be cooperatively establishing and implementing monitoring protocols that evaluate the condition of special areas. In addition, we would support the designation of new areas that are of natural, cultural, or recreational significance in the watershed. For example, on refuge lands we are currently working with the Service's Regional cultural resources staff, the Connecticut State SHPO, members of Congress, and other stakeholders to evaluate what type of special designation is appropriate for the Venture Smith property on the Salmon River Division. We also propose to expand the existing National Natural Landmark on the refuge's Pondicherry Division.

Objective 4.6 Research and Demonstration Partnerships, Particularly in Support of Climate Change Adaptation

Create, enhance, or facilitate partnerships that advance conservation research in the Connecticut River watershed, leveraging resources among partners, with an emphasis on advancing our understanding of climate change and land use impacts and pursuing adaptation strategies in response, to ensure the long-term sustainability of native fish, wildlife, plants, and associated habitats found in the CPAs.

Our proposed guidelines and strategies for working cooperatively with others to facilitate deliberate research and demonstration projects in support of climate change adaptation throughout the watershed, with priority attention to CPAs, include the following:

- ***Conservation Science Partnerships and Information Exchanges*:** Promote research and development of applied management practices in the Connecticut River watershed to sustain and enhance the natural and cultural resources in concert with partners whose mission is to advance science. Seek opportunities that engage research institutions and organizations such as universities and

colleges and non-governmental organizations. Working with the NALCC and other partners, develop, implement, and support cooperative research programs that address priority conservation and management needs or which provide basic information on species' populations, their habitat needs, and response to climate change.

Facilitate use of the refuge to apply science tools and information and implement projects identified by the NALCC and other science partners in an effort to advance our collective understanding of natural systems and to address specific conservation challenges found in the watershed. Sponsor the development and implementation of a landscape conservation design project for the watershed in partnership with the NALCC members. Encourage opportunities on the refuge for research, inventory and monitoring, and the demonstration of management practices.

Rationale: See rationale for entire objective below.

- ***Inventory and Monitoring Program***: Support cooperation among partners involved in inventorying and monitoring resources of common conservation concern. Promote the efforts of the NALCC partnership to identify common inventory and monitoring needs and help the NALCC with sharing resources to accomplish priority work. Refuge staff can demonstrate to partners existing inventory and monitoring protocols that are implemented on refuge lands, as well as share the results of the Service's Regional Refuge IMP. Refuge experiences can serve as a practical application of what information is collected, how it is collected and used, and to help establish baseline ecological conditions across a larger land base. Similarly, we would support the Service's Land Management Research and Demonstration program (LMRD) and the inventory and monitoring priorities identified for the watershed.

Rationale: See rationale for entire objective below.

- ***Climate Science and Adaptation***: Work with partners at the federal, state, and local levels to identify threats from, and to promote adaptations for addressing, climate change. Promote planning by watershed communities for resilient landscapes in an effort to minimize the impacts of climate and land use changes, and to derive the full potential of ecosystem services benefits. Promote the work of the NALCC to model land use and climate change and the projected impacts on fish, wildlife and habitats. We will particularly encourage actions to restore floodplain forests and riparian buffers that protect public and private property from increased incidents of severe weather events, and any actions that would improve water quality in rivers and streams. We would continue to promote within the watershed the particular skills and resources that some partners have to address climate change. Examples of these capacities include Trout Unlimited's skill at restoring fish passages and reconnecting tributaries to the mainstem of the river, TNC's floodplain restoration program, NRCS's grassland restoration program, Southern New England-New York Bight Coastal Program's expertise on saltmarsh restoration, and the climate change programs in each of the four States respective university systems.

  The Northeast Climate Science Center (NECSC) is part of a Federal network of eight Climate Science Centers across the country created to provide scientific information, tools, and techniques that managers and other parties interested in land, water, wildlife and cultural resources can use to anticipate, monitor, and adapt to climate change. The NECSC is hosted at the University of Massachusetts in Amherst, Massachusetts. Service staff will be active members of this important scientific community, and we will encourage other partners to be as well.

The Service plans to develop a system-wide set of best practices for adaptation to the effects of climate change. The refuge's responsibility will be to share this knowledge with partners, and implement and monitor those practices on units and divisions under our management at the refuge level. We will encourage partners to pursue these practices as well, and to share their results, local knowledge, practical experience, and observations.

Rationale: Because of the watershed's diversity of species and habitat types, it is an ideal landscape to research and monitor the effectiveness of species, habitat, and climate models developed through the NALCC and NECSC, as well as to apply adaptive land management practices. The watershed represents a north–south migration corridor for many species, with tremendous habitat diversity in terms of land cover, altitude, latitude, and aspect. It is a living laboratory to support research on fish, wildlife, and plant adaptation to the effects of climate change. Refuge lands can play a key role in research, inventories, monitoring, and evaluating land management practices attempting to address conservation issues. A list of our current scientific partnerships is included in appendix M.

Objective 4.7 Community-based Partnerships

Create, enhance, or facilitate partnerships within watershed communities that enhance the Service's ability to make positive contributions to civic life and local economies, and enrich community connections to a healthy, vibrant watershed (see objective 4.8 for those partnerships specifically dedicated to education, interpretation, and recreation).

Our proposed guidelines and strategies for working cooperatively with others to facilitate community partnerships throughout the watershed, with priority attention to CPAs, include the following:

- ***Economic Vitality within the Watershed***: In conjunction with the strategies described under goal 2–Education, Interpretation, and Outreach, above–enhance the economic vitality of communities in the Connecticut River watershed through nature-based and ecotourism initiatives, agriculture and forest protection programs, and recreational activities that both advance strategic conservation and improve broad-based visitation to the refuge. Meet with local community officials and leaders to establish how the Service can make a positive contribution to local economies consistent with the Service and Refuge System missions, and refuge purposes where refuge lands are involved. Also, communicate with local businesses when refuge staff are contemplating contracts that have the potential for economic opportunity, including timber harvest, and construction and maintenance activities.

Rationale: See rationale for entire objective below.

- ***Historic and Cultural Resources***: As appropriate, support the protection, management, and restoration of cultural resources in the Connecticut River watershed and promote opportunities to connect people to the area's rich history. Identify and develop working partnerships with academic institutions, museums, and Tribal governments with the goal of identification, protection, and interpretation of historic and cultural resources, particularly land-based features, archaeological sites and artifacts, Native American history and contemporary lives, historical buildings and sites. The refuge will not lead on projects involving the acquisition, restoration, and interpretation of historic structures, but where practical and appropriate on such projects within CFAs that include a significant land protection component, we will work to be an effective partner in the overall protection effort.

Rationale: See rationale for entire objective below.

- ***Public Safety and Wildland Law Enforcement and Emergency Response***: Whenever needed and appropriate, create law enforcement partnerships of mutual benefit to communities and the refuge. For example, the refuge's Federal wildlife officer would work collaboratively with State game wardens responsible for lands within CPAs in all four states. We would also offer to enter into mutual aid agreements to provide personnel and equipment resources to those municipalities bordering CFAs for the purpose of responding to natural disasters and other emergencies.

Rationale: See rationale for entire objective below.

Sharon Lindsay

Puddles at Mollie Beattie Bog at Nulhegan Basin Division

- ***Shared Facilities***: Whenever practical and appropriate, look for opportunities to treat the refuge land base and facilities as community assets. Make refuge buildings available for community meetings and other appropriate events. Consider opportunities to provide office space to State natural resource and other conservation partners in order to better serve the public interest. Share maintenance equipment and other resources with a wide range of partners when possible.

Rationale: See rationale for entire objective below.

- ***Easements, Leases, Cooperative Agreements, and Special Use Permits***: Employ a wide variety of agreement types to facilitate projects and other opportunities advancing conservation, environmental education, and recreation goals shared with partners in local communities. Ensure the most appropriate agreement is created for each opportunity given expected outcomes and responsibilities. For example, encourage easements to provide additional public access or manage habitats, or to protect important habitat from land development. The Service may pursue low or no-cost leases to facilitate the construction of capital improvements such as Conte Corner installations, boardwalks, trails, and interpretive kiosks. These amenities draw visitors to the area who may spend money in local communities. The Service may issue special use permits to local individuals or organizations for appropriate and compatible uses of the refuge. Cooperative agreements are also an important tool to engage partners in mutually beneficial projects where funding and resources in-kind are exchanged.

Rationale: See rationale for entire objective below.

- ***Constituent Organizations***: Promote relationships with bird clubs, outdoor recreation and sportsmen's clubs, and other constituent organizations to cultivate their support for the refuge's public use objectives, and to encourage constituent involvement in the formation and implementation of those objectives.

Rationale: Healthy watersheds are the foundation of sustainable communities and economies, in addition to benefitting fish and wildlife habitat. Among the many human benefits derived from healthy watersheds and functioning

natural ecosystems are clean air and water, food, waste assimilation, medicinal compounds, outdoor recreation and spiritual renewal (Daily et al. 1997). The economic value of such natural "goods and services" is significant and has been estimated to be twice the world's gross national product (Costanza et al. 1998). These social, economic, and ecological realities emphasize the importance of watershed based approaches to restoring and sustaining critical land and water resources, with support and recognition of the working landscape and the human communities that depend on them.

The refuge has a presence within multiple communities throughout the watershed by virtue of our management of a growing number of refuge units and divisions, and community outreach efforts. At the core of the rationale to create and maintain strong community partnerships is the requirement that we be good citizens and environmental stewards. We will continue to strive to play a positive role in the well-being of these cities and towns by managing the refuge in ways that improve the quality of the local environment, making refuge units, divisions and facilities attractive and welcoming to visitors, and capitalizing where practical and appropriate on local partnership opportunities from civic events to land management issues. A list of current partners important to our efforts to build and sustain strong community partnerships is included in appendix N.

There are many formal ways for the Service to show commitment and support for these partnerships, both monetary and non-monetary. Cooperative agreements with communities and private organizations can provide a means to share goals, such as the development and delivery of refuge-specific environmental education programming. Special use permits allow for compatible activities on refuge lands and are used to allow economic activities that enhance a visitor's experience, such as guided interpretive outings for hire. Through MOUs with other Federal agencies, state agencies, local municipalities, community groups and conservation organizations, the refuge and its partners can pool resources for important land protection projects, habitat management efforts, and recreational initiatives. Previously, the Service and NRCS shared the cost of an employee housed at the refuge, dedicated exclusively to advancing partnership opportunities between NRCS and the Service within the watershed.

Objective 4.8 Educational and Interpretation Partnerships

In conjunction with the strategies described under Goal 2–Environmental Education, Interpretation, and Outreach, above–coordinate our educational, outreach, and interpretive conservation programs with those of our partner agencies and organizations so that a consistent public message fosters respect for the natural world and gets more people motivated to promote conservation in their daily lives.

Our proposed guidelines and strategies for working cooperatively with others to facilitate connections between people and nature throughout the watershed, with priority attention to CPAs, include the following:

- ***Educational Partnerships***: Work with each of the four State environmental education program coordinators and other partners to identify effective education programs, to integrate curriculums where appropriate, and to promote consistent standards of excellence for educational programs offered in the watershed.

Rationale: See rationale for entire objective below.

- ***Integrated Messaging***: Work with environmental education partners to clearly communicate respective missions, goals, and priority programs and activities to minimize redundancy and facilitate targeted outreach and responses to constituent groups. Develop a common language about the goals of the education partnership as an effective way of attracting financial,

organizational, and human resources to the refuge and our partners. Develop and deliver integrated interpretive messages about natural, cultural, and historic resources along regional land and water trails and scenic byways that connect refuge lands with conserved properties owned by state and private partners. Contribute interpretive information regarding the refuge to partner programs such as Vermont's Scenic Byways publications. Reinforce the refuge as a location for educational programs.

Rationale: See rationale for entire objective below.

- ***Facilities Partnerships Designed to Connect People and Nature*:** Continue and enhance those partnerships based in facilities that are effective in reaching a wide and diverse demographic with consistent and productive messages about the refuge and the Service's contribution to conservation in the watershed. Continue to seek new opportunities where this same goal can be met. The existing partnerships include:

  * MOU/Cooperative Agreement between the refuge and Vermont Institute of Natural Science: This relationship provides for the development and delivery of refuge-specific programming, such as a watershed-learning module and staffing the refuge's WoW Express.
  * Cooperative Agreement between the refuge and Montshire Museum: The Montshire constitutes the refuge's Vermont "visitor center." This relationship allows the refuge to have exhibits in the museum.

  * Cooperative Agreement between the refuge and Springfield Museum: The Museum provides space to host and maintain a Conte Corner exhibit and partners with the refuge in outreach programs involving the WoW Express.

  * Cooperative Agreement between the refuge and Northwoods Stewardship Center: The Northwoods Center provides for staffing and supervision of YCC crews at several refuge divisions. YCC participants assist with trail construction and maintenance, and habitat management projects. The program informs participants about refuge goals and resources and contains an environmental education element.

  * Cooperative Agreement between the refuge and Siskin Ecological Adventures: This collaboration reaches out to those communities surrounding the Nulhegan Basin Division, engages participants in activities at the division, and informs participants about the division's conservation role and recreational opportunities.

  * MOU between the refuge and Cabela's: The Cabela's outfitter store in East Hartford, Connecticut, provides space to host and maintain a Conte Corner exhibit and support other outreach and interpretive activities in partnership with refuge staff.

  * MOU between the refuge and Putney Mountain Association: This collaboration provides for designation and management of a shared hiking trail network across ownerships, as well as, trail enhancements and publications.

  * MOU Between the refuge, the Massachusetts Department of Conservation and Recreation, and the town of Montague Economic Development and Industrial Corporation: The partnership supports the operations of the Great Falls Discovery Center in Turners Falls, Massachusetts. The purpose of the center is to provide opportunities for the study, understanding, and

enjoyment of fish and wildlife in their native habitat. The center interprets the cultural, geological, and ecological history of the watershed and encourages visitors to get involved in conservation activities. (See appendix A for more details on our proposed environmental education, interpretation, and outreach objectives and strategies for this facility).

Rationale: The 7.2 million acres of the watershed offer an extraordinary range of active and passive opportunities to observe, interact with, and recreate in the natural world. Accentuating the refuge's relevance to our constituents and their communities allows us to maintain a position of environmental leadership and enhances our ability to deliver the outcomes envisioned under the four broad goals of this CCP. Though our fundamental mission is wildlife conservation, we recognize that to be successful, we must inspire the people of the watershed to connect with the abundant natural resources and participate as stewards of the refuge. As an integral part of local communities, the refuge is a great umbrella under which to build a broader conservation constituency. The refuge will work with schools, civic groups, and individuals to share our passion for the environment and our mission. We must push ourselves to reach out to those who are yet unfamiliar with who we are and what we do. Part of our mission is ensuring that all citizens within the watershed benefit from the refuge, and this will help sustain strong support for the refuge and Refuge System as a whole. Our goal must be to inspire all Americans to become part of a conservation constituency.

Objective 4.9 Recreation Partnerships to Connect People with the Outdoors

Work with partners to promote and provide outdoor recreational opportunities in the watershed that facilitates connecting people with nature in a meaningful way, and encourages those connections over their lifetimes. Promote the development of a landscape based recreation strategy within the watershed to connect, protect, and enhance a network of aquatic and terrestrial trails.

Our proposed guidelines and strategies for working cooperatively with others to facilitate recreational opportunities throughout the watershed, with priority attention to CPAs, include the following:

- ***Federal and State Agency and Local Community Strategic Recreation Plans***: Support Federal and State agency partners in their recreational planning and implementation efforts. Those include Forest Service plans, respective States Comprehensive Outdoor Recreation Plans, and Federal and state agency transportation plans. Also, support implementation of other recreation plans developed and adopted by local communities.

Rationale: See rationale for entire objective below.

- ***Making Connections Outdoors***: Promote activities that connect people with the outdoors through improving coordination with other Federal and State agencies, including the Federal Interagency Council on Trails, the Connecticut River Recreational Management Plan (2009), educational and recreational organizations, and user groups. Help sustain regional trails that connect people with nature, such as the Northern Forest Canoe Trail, Connecticut River Birding Trail, Connecticut River Paddlers' Trail, and the "Source to the Sea" birding trail. Engage with partners to develop concept plans, interpretive materials, and conduct inventories of infrastructure to support these trails and initiatives.

Rationale: Public recreation and enjoyment of the outdoors has been part of the culture of the watershed for centuries. The range of opportunities in the area allow for visitors seeking solitude and inspiration in its forests and mountains, water-based challenges afforded by one of the nation's great rivers, and more developed opportunities. The 2009 Connecticut River Recreation Management

Plan notes that the significance of the region for public recreation is growing, as evidenced by the many special designations bestowed on the region, including scenic byways and blueways, and heritage and historic water and hiking trails. These are in addition to the thousands of acres providing public recreation on Federal and State lands. We can only expect greater public use of the river and the valley which will provide both opportunities and challenges. The challenges include encouraging the use and enjoyment of public lands, while also protecting the region's natural resources, beauty, and quality of life.

Objective 4.10 Friends Groups

Develop and nurture active and vibrant Friends groups through formal, strategic support programs, and by strengthening communication, collaboration, and cooperation. Include them as full partners in the mission delivery of the refuge and the Refuge System. Implement national guidance on mentoring Friends groups designed to ensure each group's effectiveness in supporting the refuge, as well as to provide training and organizational resources, and encourage networking among Friends groups across the Refuge System. Provide guidance to partners who want to create Friends groups on other ownerships.

Our proposed guidelines and strategies for working cooperatively with others to facilitate the creation and support for Friends groups include the following:

- ***Friends of Conte Refuge***: Encourage and cultivate the incredibly effective "Friends of Conte" group and promote them as a model for how other groups around the country can support landscape-scale conservation. Support the Friends of Conte in their work on the ground as individual organizations, and in their collective advocacy role as a regional and national voice on environmental issues and matters of importance to the Refuge System and the Service. Continue to use the Friends Steering Committee recommendations to help evaluate refuge policies and priorities for all aspects of refuge operations.

Rationale: See rationale for entire objective below.

- ***Friends Groups for Refuge Units and Divisions***: Develop, promote, and support existing Friends groups at each of the refuge's divisions. As the refuge begins to form new divisions within CFAs, help develop and grow new Friends groups modeled on the success of the Friends of Pondicherry. Strong community outreach by refuge staff in new host communities will be the key to forming new groups, as well as being responsive to community needs and interests. Annual planning will occur to set goals and objectives for projects and programs in support of the refuge and the Friends group for the coming year, as well as to evaluate the past year's activities. We will formalize each group's relationship with the Service through a written agreement. We will also encourage each Friends groups to pursue status as a 501(c)(3) organizations (under the Service's new Friends group policy, official refuge Friends groups must have nonprofit status under Section 501(c)(3) Title 26 of the Internal Revenue Service code; 633 FW 1).

Rationale: See rationale for entire objective below.

- ***Support for Friends Groups on Other Ownerships***: Continue to promote and support the Friends of the Great Falls Discovery Center and provide resources to conservation groups, landowners, neighbors, and others interested in establishing a Friends group on other ownerships.

Rationale: Friends groups have become a vital component of the work we do on the refuge. Members serve as advocates for refuge resources, partners in refuge initiatives across all four broad goals, providers of science and research on issues affecting habitat and wildlife conservation at the refuge, and volunteers at individual refuge divisions or units. They provide support for specific essential

services to our sites and programs, including community outreach, coordinating special events, developing and delivering educational, interpretive, and other visitor services programs, coordinating volunteers, conducting habitat restoration and biological program support, and assisting in maintenance projects. Friends groups are an essential and irreplaceable resource to refuge management and visitor opportunities. The Service adopted policy for Friends groups in 2014. This policy (633 FW 1-4) recognizes the values Friends groups provide in achieving the Service and Refuge System mission and provides policy, guidance, and administrative procedures for Service employees to establish partnerships and working relationships with Friends organizations.

The Friends of Conte is an "association of organizations" that has become a leading advocate for conservation, environmental education, wildlife- and fish-related recreation, and stewardship in the Connecticut River watershed. This Friends organization is comprised of more than 70 of the country's most accomplished national, regional, and local land conservation, recreation, sustainable economic, and environmental advocacy organizations. Drawing upon the broad local experience and national prominence of group members such as TNC, Audubon Society, and the Trust for Public Land, this group has effectively supported a wide variety of refuge initiatives.

The refuge is also fortunate to have the support of strong and dedicated Friends groups at its Pondicherry and Nulhegan Basin Divisions, and at the Great Falls Discovery Center. Members of these Friends groups interact with visitors, identify and assist in maintenance needs, monitor wildlife, conduct educational workshops, and provide other valuable support activities. Other Friends groups that are forming include the Connecticut River Paddlers' Trail, Friends of Roger Tory Peterson Unit, and Friends of Salmon River.

In promoting and supporting Friends groups across the country, the Service has developed many resources to assist others in that endeavor. These materials are available to our partners who may be interested in developing a similar group. In addition, if there is interest, we could help identify mentoring opportunities whereby a refuge Friends group could assist a partner group.

Objective 4.11 Intergovernmental Partnerships

Pursue strategic and synergistic intergovernmental partnerships at all levels of government to achieve specific, shared, and compatible landscape-level goals for conservation, education, and recreation within the watershed. Work within existing Federal and State programs to the full extent possible to help leverage funding and staff resources, information, and expertise among public and private partners. Formalize agreements through MOUs, Memorandums of Agreement (MOAs), or other written, intergovernmental agreements, as warranted, when the identification of roles, responsibilities, and measures of success would enhance the likelihood of successful implementation.

Our proposed guidelines and strategies for working cooperatively with others to develop strategic, intergovernmental partnerships, with priority attention to benefitting CPAs, include the following:

- **Existing Intergovernmental MOUs:** Continue to support existing MOUs and other intergovernmental agreements that are facilitating the Service and Refuge System missions, Conte Refuge goals, or other conservation priorities in the watershed. Work with partners to monitor and evaluate MOUs prior to their renewal; continue, modify, or drop MOUs as warranted. The following provides a brief overview of MOUs' currently in place.

* MOU with Natural Resources Conservation Service: This MOU, entered into in 2011, created a "Connecticut River Partnership" between the Service and NRCS to pool human and financial resources where appropriate in pursuit of the Refuge's legislative purposes and the objectives of the Obama administration's AGO initiative.

* MOU establishing the Connecticut River and Watershed National Blueway**:** The purpose of this MOU (May 2012) between the Departments of the Interior, Agriculture, and Army, is to identify and create opportunities to work together as partners to accomplish shared, compatible, and priority conservation, restoration, outdoor recreation, and environmental education objectives. A principle goal of this partnership is the pursuit of a comprehensive and integrated management approach to conserving the Connecticut River's s land and water resources.

* MOU Between the Connecticut River Watershed Council, the Friends of Conte Refuge, and Conte Refuge: This MOU (April 2012) commits the partners to actively pursue opportunities with Federal agencies to recognize, value, and obtain the necessary resources for conservation, recreation, and education opportunities in furtherance of the refuge's legislative purposes.

* MOU Establishing the Connecticut River Watershed as a Large Landscape Demonstration Project under the America's Great Outdoors Presidential Initiative*:* This MOU (December 2012) was established under existing authorities, including the President's Memorandum of April 16, 2012: *A 21st Century Strategy for America's Great Outdoors.*" This MOU recognizes the overlapping and complementary conservation interests of nine Federal agencies. It also recognized the "...great potential for mutual benefit from enhanced cooperation and synergies, especially in the area of large landscape conservation where alignment of multiple resources will result in strategic and effective conservation outcomes." Three guiding principles were identified relating to the importance of integrated planning and implementation, shared capacities, and shared science and information. Nine goals and objectives identify action items agreed upon.

Rationale: See rationale for entire objective below.

- **Federal Agency Coordination:** In addition to those relationships noted above, continue to engage Federal agencies in shared conservation goals and priorities for the watershed, and to expand, expedite, and enhance the deployment and desirable impacts of Federal programs through public and private partnerships. Seek opportunities, to the extent possible, to share financial and staff resources, information, expertise, and otherwise leverage multi-agency investments in the watershed to accomplish shared goals and attract other investors. Utilize the AGOs framework to catalyze and bolster local, community-driven conservation efforts and demonstrate how a strong Federal agency partnership can more effectively align, target, and leverage public resources across a large landscape to accomplish shared goals and objectives.

Specifically, expand on opportunities to partner with:

- The USDA and its existing agencies and programs that contribute toward the planning, managing, and sustainability of fish and wildlife habitat, water quality and watershed health, working landscapes (including agriculture and forestry), recreational opportunities, and land protection. The NRCS has eight landowner assistance programs. As mentioned under objective 4.1 above, there

is a 2016 Service Director's Order #217 detailing a partnership with NRCS to assist private landowners through their Working Lands for Wildlife and other programs and achieve agency conservation goals. The Forest Service supports land protection, management, and public access on other ownerships through their Forest Legacy, Community Forest, and Forest Stewardship programs. Additional private lands assistance is offered through the Farm Service and Rural Development agencies.

- The Department of Transportation (DOT) and its programs that facilitate public access to public lands, improve byways, develop and maintain trails, and address problematic fish barriers and wildlife crossings caused by transportation infrastructure. Public Lands Highway, Surface Transportation, National Scenic Byways, and Federal Highway Administration Recreational Trails Grants, are all DOT programs with potential funding to support projects by public and private partners.

- The Department of Labor and its programs that implement youth employment opportunities in the field of conservation. The Employment and Training Administration Program, pursuant to the Workforce Investment Act, supports grant opportunities to fund work for youth who could be employed and trained in work related to conservation.

- The Department of Commerce, NOAA, and its programs related to dam removal, aquatic species passage, and coastal wetlands restoration. Their Community-based Restoration grants and other related programs support grant opportunities for these types of projects.

- The Department of Housing and Urban Development, and its programs to help develop green open spaces in cities, restore habitats, and enhance water quality. Grants and other funding sources are available in support of these programs.

- The EPA and its programs to protect, preserve, and promote water quality, urban revitalization, habitat enhancement, and environmental stewardship. Grant funding opportunities are available for public-private partnerships through their Urban Waters Federal Partnership Initiative, Brownfields pilot program, Watershed Planning and Implementation program, Wetlands Program Development, as well as grants for monitoring and assessments, environmental education, and community watershed restoration projects.

- The USACE and its programs that manage water resources infrastructure to coordinate on fish passage concerns, opportunities to promote more natural riverine flows and function, and support outdoor recreational opportunities.

- **Tribal Government Coordination:** Under all alternatives, refuge staff would continue to coordinate with federally recognized Tribal governments in areas of mutual interest, including hunting and fishing opportunities and access, wildlife and aquatic habitat management, federally listed species management, wildlife and fish habitat projects, and land protection. Federally recognized tribes we would coordinate with include: Mashantucket Pequot Tribal Nation, Mohegan Tribe of Indians of Connecticut, Stockbridge-Munsee Band of the Mohican Nation, Narragansett Indian Tribe (Connecticut River Valley), Mashpee Wampanoag Tribe, Wampanoag Tribe of Gay Head (Aquinnah).

Rationale: As noted above, there are multiple Federal agencies with conservation missions or conservation-related programs that offer valuable contributions to the conservation community. Each can bring significant resources in pursuit of

the four Conte Refuge goals related to conservation, education, recreation, and partnerships.

The AGO's initiative provides a framework within which to work together to meet those goals. The framework provides a catalyst for Federal agencies to lead or facilitate efforts promoting the watershed as nationally significant for conservation, education, and recreation. The design is to work within current Federal authorities and funding, and leverage those resources to attract other public and private partners to "invest" their resources consistent with their own priorities. This collaboration, as described in the America's Great Outdoors MOU would serve to "…bind together the many existing and complimentary visions for the River, held by a wide array of governmental and NGOs to stimulate new achievements and energize existing creative public and private partnerships in the spirit of the America's Great Outdoors Initiative."

While some beneficial programs are listed above, there are likely more to be explored, and some new programs have potential for the near future. For example, under consideration in Congress is a new Water Resources Development Act (WRDA) which would authorize the USACE, as managers of the nation's largest water resources program, to develop cost-effective, nature-based solutions to water problems and modernize our water infrastructure.

The status of the Farm Bill is always noteworthy. A 5-year reauthorization was recently enacted. Some argue that this Act represents the nation's largest investment supporting the voluntary and successful conservation, restoration, and management of America's private lands. It provides incentives to farmers, ranchers, and other private landowners that result in cleaner water, improved soil conservation, enhanced wildlife habitat and outdoor recreation opportunities, reduced flood risk, and stronger local communities.

With regards to federally recognized Tribal governments, the U.S. has a unique legal relationship with these governments as set forth in the Constitution, and in treaties, statutes, executive orders and court decisions. The U.S. recognizes these tribes as domestic dependent nations under its protection and has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

Due to this unique and distinctive political relationship, the Service maintains government-to-government relationships with federally recognized Tribal governments. In particular, the Service works directly with Tribes when planning and implementing natural resource programs, and to protect and respect Native American values.

Close coordination with federally recognized Tribes supports all four refuge goals.

Comparison of Management Objectives, Actions, and Strategies by Alternative

Table 4.6 below further compares and contrasts what distinguishes the four management alternatives evaluated in detail in this final CCP/EIS. It provides additional details on the strategic management direction and actions that would be undertaken for each alternative. The listing of strategies and associated actions by alternative in the table below assumes each respective alternative's full implementation, including the staffing, funding, and infrastructure needed to support those strategies and actions. The presentation is organized by resource and program features. Further details on implementing Alternative C, the Service-preferred alternative, are presented in appendix A and C. We recommend readers also consult the preceding sections in chapter 4 titled "Actions Common to All Alternatives" and "Actions Common to Alternatives B, C, and D" to understand the full range of actions proposed under each alternative.